

FINANCIAL RISK TOLERANCE: A CULTURAL COMPARISON

Exploring risk tolerance scores of Singaporeans and Finns

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International Business

Bachelor's Thesis

Supervisor: Roman Stepanov

Date of approval: 9 April 2018

Aalto University

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Objectives: The main objectives of this study were to 1. Explore the risk tolerance of Singaporean college students, 2. Explore the risk tolerance of Finnish college students, 3. Gauge if there are differences in the risk tolerance between the countries, 4. Explore the risk tolerance of females, 5. Explore the risk tolerance of males and 6. Gauge if there are differences in the risk tolerance between the genders.

Summary

The risk tolerance was researched by using a questionnaire developed by Grable and Lytton and combining the answers for a total score. The sample of this study consisted of Finnish and Singaporean university students. The findings conclude that there were no significant differences between the financial risk tolerance of Finns and Singaporeans. However, there were significant differences between females and males.

Conclusions

The findings can be used for, example given, the customization of investment portfolios for individuals from different countries. Additionally, the fact that there are significant differences between females and males can be used to further customize investment advice for each gender.

Key words: financial risk tolerance, Singapore, Finland, risk tolerance, survey, investment, risk profile, risk aversion

Language: English

Grade:

COVER PAGE

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ABSTRACT

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1. INTRODUCTION

1.1. Definition of risk tolerance and research questions

The field of risk profiling has been researching factors that contribute to investors' financial risk tolerance. Deo and Sudar (2015) state that risk tolerance level is one of the 'significant determinants' of one's investment behavior (p. 80). Grable (2000) has given financial risk tolerance the following definition: 'the maximum amount of uncertainty that someone is willing to accept when making a financial decision' (p. 625). Additionally, multiple variables have been defined that may affect a person's financial risk tolerance level.

The research questions for my Bachelor's Thesis are as follows:

1. Does the financial risk tolerance differ between Finnish and Singaporean university students?
2. Do females and males have different financial risk tolerance profiles?

1.2. Background

Some of the variables that affect the risk profile include, among others, age, wealth, financial knowledge and gender. As mentioned in the research questions, this Thesis will focus on Singaporean and Finnish university students. The main theories in the field are the Expected Utility Theory and the Prospect Theory (Bernoulli, 1738/1954, cited in Corter & Chen, 2006; Tversky & Kahneman, 1992). Additionally, a more cultural approach has been invented, labeled as the Cushion Hypothesis (Weber & Hsee, 1999).

Financial risk tolerance has been at the center of multiple researches. Most commonly, the studies seem to use a Survey of Consumer Finances (SCF) and/or the questionnaire developed by Grable and Lytton. However, some researchers have chosen to use their own questionnaire. This Bachelor's Thesis will use the questionnaire by Grable and Lytton as a base for the research, as it complies with the research objectives better as it focuses more on the financial risk tolerance as a whole and at a deeper level (Gilliam et al., 2010). In comparison, the SCF is suggested to

focus more on the investment risk (ibid). Additionally, the G&L questionnaire is said to have a greater explanatory power (ibid). As the objective of the research is to focus on the financial risk tolerance as a whole, and not in investment risk in particular, the Grable and Lytton's questionnaire suits the objectives better.

The literature review will first introduce relevant theories: starting from Bernoulli's Expected Utility Theory and Tverky and Kahneman's Prospect Theory. Additionally, the literature review will explain the Cushion Hypothesis, which can be used to explain cultural differences in financial risk tolerance. This is especially important for this Bachelor's Thesis, as the Thesis will compare the financial risk tolerance of Singaporean and Finnish university students.

After the theories, the literature review will review and compare the effective frameworks to measure risk tolerance and cultural differences. The effective frameworks to measure financial risk tolerance include the Survey of Consumer Finances' model and a questionnaire developed by Grable and Lytton. The framework used to compare cultural aspects is Hofstede's six cultural dimensions.

Next, the literature review will explore and compare the existing literature on the field based on the variables found relevant for financial risk tolerance: wealth, gender, age, financial knowledge, personality and culture. Lastly, the literature review will propose a conceptual framework for the Bachelor's Thesis consisting of the variables and their relationships to financial risk tolerance.

2. LITERATURE REVIEW

2.1. Theories related to financial risk tolerance

Risk has been an interest of research since the 18th century. One of the earliest researchers in the field is the mathematician Bernoulli (1738) who created the Expected Utility Theory, which has been referred to in multiple researches ever since. Many of the terms in the field of risk profiling have, in fact, been introduced by the Expected Utility Theory by Bernoulli and the Prospect Theory by Tversky and Kahneman (Bernoulli, 1738/1954, cited in Corter & Chen, 2006; Tversky & Kahneman,

1992). Additionally, Weber and Hsee (1999) created the Cushion Hypothesis, which aims to explain cultural differences in risk preferences.

2.1.1. The Expected Utility Theory

According to the Expected Utility Theory, people tend to be naturally risk-averse, at least when making decisions with outcomes that can include gains, losses or a combination of these (Bernoulli, 1738/1954, cited in Corter & Chen, 2006). The Expected Utility theory has later been advanced to focus more on expected outcomes (Von Neumann & Morgenstern, 1947). Investors tend to select choices that provide the highest expected outcomes (ibid).

The theory argues that individuals take different degrees of financial risk, referred to as the risk propensity, which the theory 'ascribed to differences in the wealth of investors, with wealthier investors being willing to incur more risk' (Bernoulli, 1738/1954, cited in Corter & Chen, 2006: 370). This view is supported by other studies (e.g. Finke & Huston, 2003). Additionally, studies take the view of wealth affecting financial risk taking further. It has been argued that education, and hence a promise of higher income, can lead to investors tolerating more risk (Finke & Huston, 2003; Gumus & Dayioglu, 2015; Sriharsha & Mahapatra, 2017).

However, this view can be seen to simplify an investor's attitudes towards risk. It has later been discovered that risk, in fact, is affected by multiple factors beyond one's wealth. Nevertheless, the Expected Utility Theory introduced the concept of risk aversion, which remains in use. Risk aversion means that a person chooses the option with less risk, when facing two different options. For example, if a person has two investment opportunities with similar returns, one of which one contains more risk, one less, the investor would choose the investment with less risk involved.

2.1.2. The Prospect Theory

The Prospect Theory, created by Tversky & Kahneman, introduces an approach that people tend to outweigh small probabilities and underweigh high probabilities (Tversky & Kahneman, 1992). Hence, investors do not always act rationally. This approach has been further researched by Odean (1998), who concluded that investors are more

reluctant to realize their losses. In fact, investors tend to keep losing investments too long and sell winning ones too soon, referred to as the Disposition Effect (ibid). Kalb (n.d.) argues that 'selling winners works like an insurance against falling stock prices, whereas holding losers works like a gamble to get lucky and earn a gain' (p. 27).

The Prospect Theory claims that investors show loss aversion, hence, a financial loss might have a greater impact, even though the gain would be an identical amount (Tversky & Kahneman, 1979, cited in Corter & Chen, 2006). The Prospect Theory explains this as an investor's reluctance to accept losses (Tversky & Kahneman, 1992). Thus, it can be more pleasing for an investor to gain a small amount of money, compared with losing money and then gaining it back, even though the end result would be the same (ibid).

2.1.3. The Cushion Hypothesis

Weber & Hsee (1999) introduced the Cushion Hypothesis in their research on risk preferences. The research focused on Chinese and Americans. The findings concluded that Chinese are more risk-seeking than Americans. The authors suggest that this might be affected by the different social networks in China and United States (ibid). Moreover, the Cushion Hypothesis tends to be stronger in collectivistic countries, such as China (ibid).

Weber & Hsee (1999) explain that Chinese tend to have a social network that they can turn to for financial support, consisting of family members and close friends (ibid). In an individualistic country, members of the community are not guaranteed to give financial support. On the other hand, individualistic cultures tend to provide their members with more emotional support (ibid).

In fact, Weber & Hsee (1999: 172) argue that Chinese tend to get 'substantive material and financial assistance' from their family and close friends. It is argued that this may result in an individual's preference to taking more risks as they have a 'cushion' to fall back to (ibid). Hence, the outcome of losing money might be less severe to Chinese than Americans (ibid). Due to this, the Chinese can appear to be more risk seeking as they do not have to be as concerned of the adverse outcome.

Next, the literature review will cover frameworks that can be useful when measuring financial risk tolerance. The theories provide a theoretical approach on how the variables, such as culture, might be linked to financial risk tolerance. The frameworks, such as the SCF model and Grable and Lytton's questionnaire, will introduce ways to measure the financial risk tolerance.

2.2. Frameworks measuring financial risk tolerance

There are two popular ways to measure risk tolerance: Federal Reserve Board's Survey of Consumer Finances (SCF) measurement and a multidimensional questionnaire created by Grable and Lytton which includes 13 questions related to risk tolerance. Both measurements have been featured in multiple researches. Additionally, one crucial factor in this thesis will be culture. Hence, cultural comparisons can be derived from Hofstede's studies. Studies have shown that culture affects risk tolerance (Weber & Hsee, 1999; Fan & Xiao, 2006; Nobre, Grable, Da Silva & Da Veiga, 2016).

Besides introducing both the SCF model and the questionnaire developed by Grable and Lytton, the literature review will also contrast and compare these two models. In addition to these two models, some researches have chosen to use their own questionnaire to measure risk tolerance.

2.2.1. The Survey of Consumer Finances (SCF)

The Survey of Consumer Finances' model focuses on measuring the investment risk (Gilliam, Chatterjee, & Grable, 2010). The versions tend to be updated every three years, and some of the questions change over time (Grable & Lytton, 2001). However, the SCF includes one question that has been featured since 1983 (Grable & Lytton, 2001). The question aims to measure financial risk tolerance by asking the respondent how much financial risk they take when saving or making investments (ibid). Numerous studies have used the SCF questionnaire, including Sung & Hanna (1996), Chen & Finke (1996) and Xiao (1996).

It seems to be one of the most popular ways to measure risk tolerance, based on the number of resources using it. However, there is literature stating that the SCF might be more focused on measuring investment risk instead of risk tolerance (Gilliam, Chatterjee & Grable, 2010). Grable & Lytton (2001) argue that the SCF might focus too much on an individual's financial experience. Additionally, it is argued that a person's financial situation might affect the results (Chen & Finke, 1996; Grable & Lytton, 2001).

Grable and Lytton have provided an alternative version to measure financial risk tolerance, which is discussed in the next section (3.2.) As the Grable and Lytton's model is viewed to measure financial risk tolerance as a whole, which is the objective, this Bachelor's Thesis will use the Grable and Lytton's questionnaire as a measurement. Next, the literature review will discuss another popular model used to measure risk tolerance, which is the questionnaire that Grable and Lytton have developed.

2.2.2. Grable and Lytton's Questionnaire

Another popular way to measure risk tolerance is the questionnaire developed by Grable and Lytton (2001). The questionnaire aims to measure risk tolerance by providing 13 questions. The questions include, among others, questions regarding how comfortable a person is taking financial risk and how they view risk. Moreover, it describes various situations related to investing and aims to define a person's risk tolerance based on the answers. After the questionnaire has been answered, Grable and Lytton provide a scoring table to count how many points a respondent received from each question, where 'higher points indicated higher level of risk tolerance, whereas lower points indicated lower level of risk tolerance' (Yang, 2004). The points will be summed for a total score (Yang, 2004).

The model's accuracy has been verified multiple times (Kuzniak, Rabbani, Ruiz-Menjivar & Grable, 2015; Gilliam, Chatterjee & Grable, 2010). The original creator of the measure, Grable, has taken part in both of these studies. Kuzniak et al. (2015) provide evidence that the scale still performs reasonably well measuring risk tolerance. The study featured 160 000 users of Grable and Lytton's Risk Tolerance Questionnaire

(RTQ). As the study featured hundred thousand respondents, it can be seen as a stable presentation of respondent's opinions regarding the questionnaire.

The results indicated that the questions are still accurate up to this day (Kuzniak et al., 2015). Even though the questionnaire was developed in 1999, it still remains accurate to this day even though factors such as technology might have changed answers and the existence of various cryptocurrencies, which can tempt more risk seeking investors with high returns despite its volatility (ibid).

Moreover, the SCF and Grable and Lytton's measures have been compared (Gilliam, Chatterjee & Grable, 2010). The study featured 328 respondents from faculty and staff of southwest colleges and universities in the United States (Gilliam et al., 2010). The study launched an online survey with 38 questions regarding people's attitudes towards the two measurements (ibid). Their finding was that the measure developed by Grable and Lytton has greater explanatory power and measures financial risk tolerance more in-depth whereas the SCF measure focuses on investment risk (ibid).

However, as the focus group consisted only of U.S. Americans, it remains unclear whether Europeans and Asians view the tests similarly. Filling this gap will be of interest in this Bachelor's Thesis as it will compare Finnish and Singaporean university students, hence, a sample of a European and an Asian culture. As both countries have a good education system, are of a similar size and have a high level of English, which is the language of the survey, the results of these two countries should be comparable.

The Cushion Hypothesis proposes that Chinese are more risk-seeking than Americans (Weber & Hsee, 1999). Additionally, the Cushion Hypothesis seems to be stronger in collectivistic countries (Weber & Hsee, 1999). According to Hofstede's model, which will be fully introduced in the next section, Singapore and China both score 20 on the individualism dimension, whereas Finland's score is 63 (www.hofstede-insights.com). As Singapore and China both score 20, they are said to be 'highly collectivistic culture(s)' (www.hofstede-insights.com). Hence, the Cushion Hypothesis is assumed to apply to Singapore as well. The Cushion Hypothesis, or culture in general, does not have specific questions allocated to it in the Grable and Lytton's questionnaire. However, the questionnaire can be completed by people from different cultures and

the scores can then be compared with each other, which is one of the objectives of this research.

As the Expected Utility Theory suggests, people tend to be risk averse by nature (Bernoulli, 1738/1954, cited in Corter & Chen, 2006). The Grable and Lytton's questionnaire includes questions to measure risk aversion, such as "In addition to whatever you own, you have been given USD \$1,000. You are now asked to choose between: a. A sure gain of USD \$500 or b. A 50% chance to gain USD \$1,000 and a 50% chance to gain nothing" and "In addition to whatever you own, you have been given USD \$2,000. You are now asked to choose between: a. A sure loss of \$500 USD or b. A 50% chance to lose \$1,000 USD and a 50% chance to lose nothing". Hence, the questionnaire aims to measure the risk aversion of people to see if they are more inclined to be risk-averse or risk-taking (option a or b). The Expected Utility Theory proposes that people would be more inclined to be risk-averse (Bernoulli, 1738/1954, cited in Corter & Chen, 2006).

Additionally, the order of the risk aversion questions is linked to the Prospect Theory, which was introduced earlier. The questions mentioned in the previous paragraph have the following order: the first question asks about a possible gain of money and the second question asks about a possible loss of money. Hence, the order is specific, as the Prospect Theory suggests that it may be more pleasing for an investor to gain a small amount of money initially in comparison with losing money first and gaining it back later, which would be the situation if the questions were in the opposite order (Tversky & Kahneman, 1992).

Moreover, the Prospect Theory proposes that investors show loss aversion, therefore a financial loss might have a greater impact (Tversky & Kahneman, 1979, cited in Corter & Chen, 2006). As the The Prospect Theory explains this as an investor's reluctance to accept losses, the respondent might be more willing to take a chance on the second question which asks about a loss of money (Tversky & Kahneman, 1992).

Next, Hofstede's six cultural dimensions will be introduced in order to further explore the differences between cultures that might affect risk tolerance. As one of the

objectives of this research is to explore cultural differences in risk tolerance, Hofstede's model can be helpful in this regard.

2.2.3. Hofstede's six cultural dimensions

Hofstede developed a model exploring the cultural dimensions of different cultures, originally appeared in his publication called 'Culture's Consequences: International Differences in Work-Related Values' which was published in 1980 (Kirkman, Lowe & Gibson, 2006). Hofstede developed a model to measure the cultural dimensions (Kirkman, Lowe & Gibson, 2006). The scores have later been updated in a new edition, published in 2010, in the book 'Cultures and Organizations: Software of the Mind' (2010). The book includes scores from a total of 76 countries, which are determined partly through 'replications and extensions of the IBM study on different international populations and by different scholars' (www.hofstede-insights.com, n.d.).

Hofstede's model originally provided four dimensions to measure countries with (Kirkman, Lowe & Gibson, 2006). Later, it was extended to six dimensions (Kirkman, Lowe & Gibson, 2006). The four dimensions included power distance, uncertainty avoidance, individualism versus collectivism and masculinity versus femininity (ibid). The two dimensions that were added later consist of long-term versus short-term orientation and indulgence versus restraint (Kirkman, Lowe & Gibson, 2006; Hofstede, 2011). The latest added dimension to the model was done in 2010 (Hofstede & Minkov, 2010). Hence, the model can still be seen as updated and effective. The model has been reviewed after the additional dimension (Hofstede, 2011).

Hofstede (2011) defines the dimensions as follows:

1. Power distance: 'different solutions to the basic problem of human inequality' (p. 8), which refers to how much distance there is between the powerful and less powerful persons in the culture.
2. Uncertainty avoidance: 'indicates to what extent a culture programs its members to feel either uncomfortable or comfortable in unstructured situations' (p. 10).
3. Individualism versus collectivism: 'degree to which people in a society are integrated into groups' (p. 11)

4. Masculinity versus femininity: 'distribution of values between genders' (p. 12), where the feminine values are seen as more modest and caring and masculine values as assertive and competitive.
5. Long-term versus short-term orientation: 'choice of focus for people's efforts: the future or the present and past' (p. 8).
6. Indulgence versus restraint: refers to aspects that are not covered in the previous five dimensions, and hence includes the "happiness factor", which explores whether the society allows 'free gratification' of emotions and having fun or controls this by 'strict social norms' (p. 15).

Hofstede's cultural dimensions can be used to measure risk tolerance, as suggested e.g. by Fan and Xiao (2006) and Weber and Hsee (1999), who suggest differences exist between individualistic and collectivistic countries' citizens. As Hofstede's model includes a dimension of individualism versus collectivism, the framework can be useful in measuring the differences between those cultures.

For example, Singapore is more of a collectivistic country than Finland, which is a more individualistic country (Hofstede, 2011). In fact, as mentioned earlier, Singapore scores only 20 on the individualism dimension, whereas Finland's score is 63, indicating that Finland is a much more individualistic country (www.hofstede-insights.com, n.d.). Hence, this cultural dimension might explain some of the differences between the results on the financial risk tolerance of Singaporean and Finnish university students.

2.3. Existing studies: identifying variables related to risk tolerance

Studies show that there are multiple factors that might affect a person's risk tolerance. Some of these factors include personality, age, gender, financial situation and culture. These factors have been established and explored by multiple studies and theories (e.g Weber & Hsee, 1999).

2.3.1. Wealth and risk tolerance

According to Bernoulli's Expected Utility Theory (1838/1954, cited in Corter & Chen, 2006: 370), a person seems to 'exhibit decreasing marginal utility for money in the

domain of gains'. Therefore, a gain of money can be less important to a wealthy person when compared with a poor one.

Studies have explored how the wealth, which often consists of net worth and amount of financial assets, affects an individual's risk tolerance. According to the Expected Utility Theory, the hypothesis seems to be that the wealthy can afford to take more risks as the amount of money lost is relatively lower for them than those with less wealth (Bernoulli, 1938/1954, cited in Corter & Chen, 2006).

Finke and Huston (2003) measured risk tolerance by considering level of net worth and level of financial assets as their dependent variables. The authors used the Survey of Consumer Finances (SCF) data and codebook (ibid). Finke and Huston's (2003) findings conclude that investors who have higher net worth in financial assets and a higher income tend to take greater financial risk than those who have less money.

Additionally, Guiso and Paiella (2007) measured risk aversion, wealth and background risk in their working paper. The study by Guiso and Paella (2007) used data from the Bank of Italy Survey of Household Income and Wealth (SHIW). The data is from the year of 1995 and it aims to measure the willingness of a household 'to pay for a hypothetical risky security' (Guiso & Paella, 2007: 4). The findings confirm that individuals who have income uncertainty or constraints on their asset liquidity have higher risk aversion (Guiso & Paella, 2007).

As the sample used in the Bachelor's Thesis includes only university students, their wealth is expected to be around the same as students have limited full-time working possibilities while studying at the same time. Hence, wealth will not be included as a variable in the Thesis. Additionally, as the Thesis will focus on Singapore and Finland, the cultures differ greatly in this aspect. In Finland, the students get student money from the government. In Singapore, the students might have to rely more on family for financial support. As the cultures differ greatly and the objective is to measure an individual's financial risk tolerance, separate from their family's resources, wealth will not be included in the research. It can be difficult to determine how much parents are willing to support their children financially and how much this affects the individual's

financial risk tolerance. Additionally, studies focusing on university students exclusively do not support including the wealth as a variable (Wasiuzzaman & Edalat, 2016).

2.3.2. Gender and risk tolerance

It has been questioned whether gender itself has an effect on investment risk profiles. Badunenko, Barasinska and Schäfer (2010) researched whether gender has an effect on the risk preference of Europeans. The research takes into account that risky assets need to be analyzed as a two-step process: including participation decision, which refers to the 'decision to hold or not to hold risky financial assets', and allocation decision, meaning the 'fraction of disposable financial wealth invested in risky financial assets' (ibid: 8). Also, their research includes a control variable which captures individual risk preferences along with gender and socioeconomic variables (Badunenko et al., 2010).

Badunenko et al. (2010) concluded that males are more likely to hold risky assets than females –this relationship gets stronger when one focuses on the ownership of directly held stocks. An earlier research supports this finding that women invest in less risky assets than men (Embrey & Fox, 1997). Secondly, in respect for allocation decision, the regression analysis shows that 'males and females invest equal shares of their wealth in risky financial assets' (Badunenko et al., 2010: 22).

Deo and Sundar's (2015) findings on Indian respondents concludes that men are more willing to take above average risk. In comparison, very few women were willing to take medium risk (Deo & Sundar, 2015). Instead, female respondents preferred less risk (Deo & Sundar, 2015). Overall, men reported a higher financial risk tolerance (Grable, 2000; Deo & Sundar, 2015). Khan (2017) confirms this finding in their study on investor characteristics and risk tolerance, which used both the questionnaire by Grable and Lytton and the SCF.

On the contrary, this finding might be linked to cultural differences: a study consisting of Malaysian college students found that women have higher financial risk tolerance than men (Wasiuzzaman & Edalat, 2016). Nevertheless, this relationship is insignificant (ibid). This will be discussed more in detail under *Culture and risk*

tolerance. Gender will be included as a variable in the Bachelor's Thesis in order to gauge the differences between Singaporean and Finnish females and males. The Thesis explores if there are differences between Finnish and Singaporean female university students versus Finnish and Singaporean male university students.

In addition, financial knowledge might affect these results more than gender –only 15.7% of the respondents with a Bachelor's degree were women, the remaining being men (Deo & Sundar, 2015). Hence, some of the gender differences proven by this research can be more attributed to different degrees of education and financial knowledge. Additionally, men tend to trade more actively than women (Deo & Sundar, 2015), and hence, they might be able to gather more financial knowledge.

Barber and Odean (2001) suggest that men tend to be more over-confident than women and hence, they tend to make riskier decisions. In fact, women are more likely to consult with an advisor when investing (Deo & Sundar, 2015), which can be a sign of lack of confidence in their investment choices. Prince (1993) argues that men and women are both as likely to attribute money with esteem and power. However, men are more likely to be involved and competent with handling money and hence, they tend to take higher risks to gather wealth (Prince, 1993).

2.3.3. Age and risk tolerance

Multiple studies show that younger people tend to take greater risks than older persons (Finke & Huston, 2003; Jianakoplos & Bernasek, 2006). It is argued that there is a negative relationship between age and risk tolerance (Hallahan, Faff & McKenzie, 2014). This might be due to younger people having more time to make up for their possible losses due to risky investments. Additionally, studies show that younger people tend to take more risk generally than older people (Finke & Huston, 2003). In fact, Finke and Huston determined the average ages for the groups: the mean age of those who are willing to take greater risk is 42, compared with 55 which is the mean age for the group who is willing to take less risk (Finke & Huston, 2003).

However, there also exist contradictory findings. For example, Sriharsha & Mahapatra (2017) state that there is a positive relationship between age and risk tolerance. Some

studies show that wealth might attribute to this, as older people tend to own higher financial assets than younger people, and hence, be more tolerant towards risk (Finke & Huston, 2003) who have high assets tend to be more tolerant towards risk than those who do not own such assets.

As mentioned earlier, many contradicting results exist. For example, Finke and Huston (2003) also confirm that older investors are willing to take less risk than those who are younger. Hence, it is unclear which one attributes more to risk tolerance: age or wealth. One possible explanation was provided by Hanna, Gutter and Fan (2001) who claim that 'age was not significantly correlated with risk tolerance, but controlling for other factors, the number of years until retirement was related to risk tolerance' (p. 54). The authors used the model by SCF (Hanna, Gutter & Fan, 2001). The fact that aging investors tend to be more risk averse was also confirmed by Alanko (2009) in his study of Finnish investors. However, the investors' portfolios seem to reflect this with a delay (Alanko, 2009).

As the Bachelor's Thesis will focus exclusively on university students, age might not be as an important variable as the university students are expected to be of a similar age. Hence, as the data proves that the students included in the research are of very similar age, age will not be included in the test.

2.3.4. Financial knowledge and risk tolerance

Financial knowledge was described as an important factor for future studies by Badunenko, Barasinska and Schäfer (2010) in their study of risk attitudes and investment decisions across Europe. A few years earlier, in 2006, Corter and Chen researched the impact of investment experience, on graduate students' risk tolerance (Corter & Chen, 2006). However, a gap still exists to combine both culture and financial knowledge into one study. Nguyen has tried to fill this in his Bachelor's Thesis on the risk profile of the Millennial generation. For this Thesis, in order to determine one's financial knowledge, questions related to the amount of finance classes they have taken and self-reported levels of financial knowledge will be asked. Hence, financial knowledge will be of interest in this Thesis as well.

Corter and Chen (2006) measured the risk tolerance of graduate students, and hence, the findings can be useful for this thesis as the focus group is undergraduate students. Corter and Chen (2006) used a Risk Tolerance Questionnaire, which they developed themselves. Multiple other studies have used either the SCF or G&L measurements, which were described in the frameworks, whereas the RTQ developed by Corter and Chen (2006) seems to be used mainly in their own research. Some other authors have also developed a risk tolerance questionnaire themselves.

Nevertheless, Corter and Chen's (2006) findings declare that investment experience, which can be seen as a part of financial knowledge, correlates with risk tolerance. Those with more investment experience showed more risk tolerance and portfolios with higher risk, compared with those who had limited investment experience (ibid). Nguyen (2017) confirms this result as his findings show a positive relationship with financial knowledge and risk capacity. There was also a positive relationship with financial knowledge and the risk need (ibid).

Finke and Huston (2003) used the SCF measure in their research on wealth and risk tolerance. They also measured how education and financial risk tolerance are correlated (ibid). The findings agreed that those with at least high school education were more willing to take greater financial risk than those who had less than a high school diploma (ibid). As education can increase the financial knowledge of a person, these two can be seen as highly correlated. This is also confirmed by Khan (2017). Hence, the results are similar to those measuring financial knowledge or investment experience (Finke & Huston, 2003; Nguyen, 2017; Corter & Chen, 2006).

2.3.5. Personality and risk tolerance

Zuckerman (1994) proposes that risk seeking as a trait might be related to personality, and those who possess this trait might tolerate anxiety better or seek excitement. In addition, it has been proposed by some researchers that personality might, in fact, affect the investment risk profile, too (ibid).

Grable (2000) identified that type A individuals are more risk tolerant than type B individuals. In addition, type A personalities have higher levels of education, income, financial knowledge and a higher occupation status (ibid). The research consisted of

staff and faculty at a southwestern university in the US, and the youngest participant was 20 years old (ibid). Additionally, Grable and So-Hyun's (2004) studied self-esteem and financial risk tolerance. Their findings conclude that self-esteem is positively related to financial risk tolerance (Grable & So-Hyun, 2004).

Wasiuzzaman and Edalat (2016) explored personality traits, such as extroversion and narcissism, through Facebook activities. The study focused solely on college students in Malaysia and their sample size was 220 (ibid). They controlled for gender, age, and financial knowledge. Wasiuzzaman and Edalat (2016) measured extroversion and narcissism by asking the respondents to answer questions related to their activity on Facebook, such as the number of friends on Facebook. The results found out that logging frequently to Facebook indicates that an individual has a higher financial risk tolerance (ibid). Moreover, if a person uses social networks for social connection, they have a lower financial risk tolerance (ibid). As this Bachelor's Thesis will be focused mainly on the cultural comparison, personality will not be measured. Rather, this Thesis focuses on comparing the financial risk tolerance of two cultures, i.e. Finnish and Singaporean.

2.3.6. Culture and risk tolerance

There have been multiple studies that take into account culture and financial risk tolerance. Many of these compare either European countries with each other or United States with one or more countries in Europe. However, there is a limited amount of studies comparing an Asian culture with a European one. All in all, multiple studies seem to show that Asians tend to take more risk than US Americans (Fan & Xiao, 2006; Weber & Hsee, 1999).

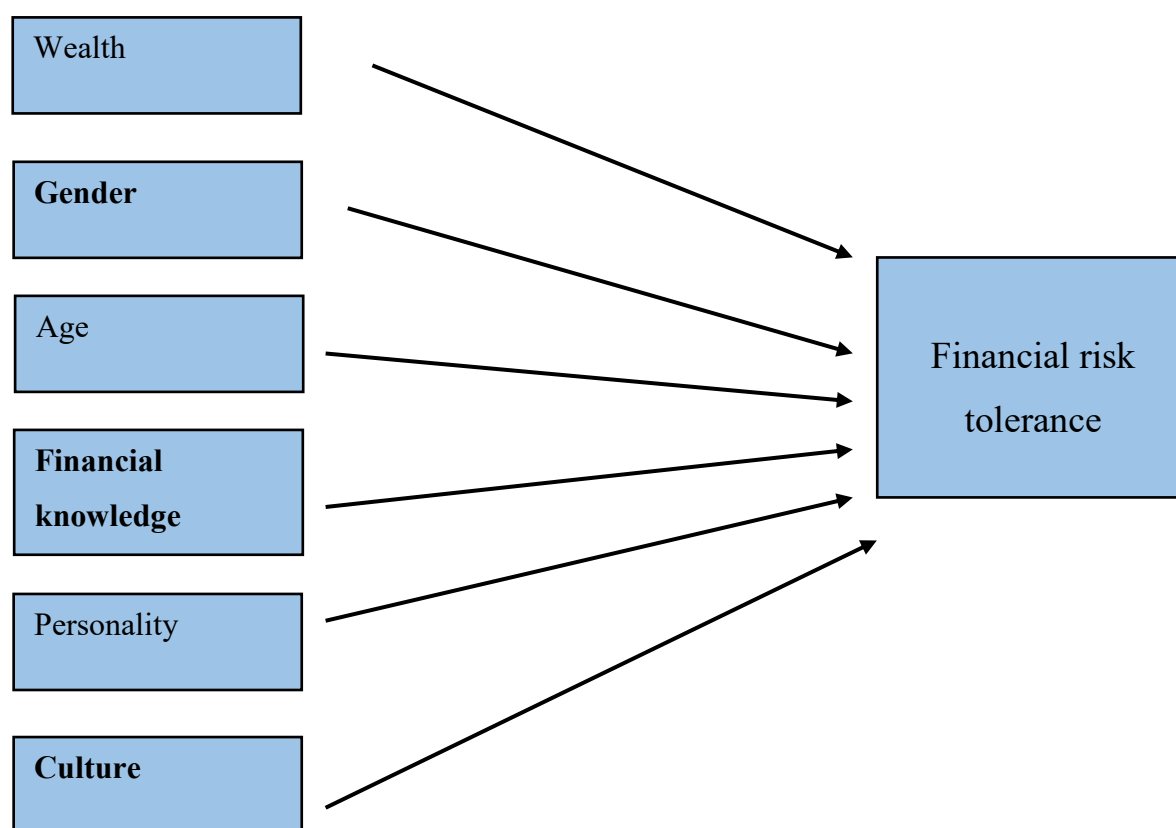
Wasiuzzaman and Edalat's (2016) findings conclude that female university students have higher financial risk tolerance compared with male university students in Malaysia. Later, this was found to be insignificant (Wasiuzzaman & Edalat, 2016). This might be linked to the researchers using convenience sampling (ibid).

Comparing countries, Fan and Xiao (2006) confirm that Chinese were more risk tolerant than Americans. Additionally, the Chinese tend to be more risk seeking than Americans (Weber & Hsee, 1999). Weber and Hsee (1999) developed the 'Cushion

Hypothesis' to explain these differences in how culture affects financial risk tolerance. Moreover, Asian women are as confident with risk-taking as Asian men (Hewlett, Turner Moffitt & Marshall, 2014). In Singapore, 66% of women identify as the primary decision maker when it comes to household investable assets (Hewlett, Turner Moffitt & Marshall, 2014). It is also suggested that women in Singapore take more risk than men (*Singapore Investor Attitudes Index*, 2012). As this Bachelor's Thesis will focus on Singaporean and Finnish university students, it is possible to compare these groups with each other.

Differences also exist within Europe. When Italian and Dutch men were compared with their female counterparts, it was concluded that men tend to hold higher shares of risky assets (Badunenko et al., 2010). Alanko (2009) explored Finnish investors in his Master's Thesis from the Helsinki School of Economics (now Aalto University). His findings show that Finnish investors are very risk averse (ibid). In addition, the more a person has invested in equities, the more willing they are to take risk (ibid).

2.4. CONCEPTUAL FRAMEWORK



The conceptual framework identifies the variables that affect financial risk tolerance. The ones that are in bold will be of special interest to this Bachelor's Thesis. The study left out three variables that have been included in some studies: wealth, age and personality. This was due to the objectives of the research. Overall, the research wanted to focus on achieving the following:

1. Explore the risk tolerance of Singaporean college students
2. Explore the risk tolerance of Finnish college students
3. Gauge if there are differences in the risk tolerance between the countries
4. Explore the risk tolerance of females
5. Explore the risk tolerance of males
6. Gauge if there are differences in the risk tolerance between the genders

Hence, the research will focus on measuring the variables which help to measure the objectives of this Thesis. Therefore, gender and culture were chosen as variables. In addition, financial knowledge was also chosen as a variable, as studies show it affects risk tolerance and including it helps to focus on culture and gender, as the differences in financial knowledge are taken into account (Finke & Huston, 2003; Nguyen, 2017; Corter & Chen, 2006).

The Thesis will use Grable and Lytton's financial risk tolerance questionnaire. Additionally, this Thesis' survey includes demographic variables such as gender and age. The research also includes a measurement of financial knowledge which is measured through the amount of finance classes a person has taken and/or self-study.

Furthermore, the research will focus exclusively on students as the Millennial generation is growing and will make for a significant part of the future clients of financial advisors. Hence, it is important to determine how culture affects the younger generation's financial risk tolerance as the world becomes more globalized and cultures melt together. In addition, younger generations are more exposed to other cultures through internet. As university students make up a good proportion of the Millennial generation, this study will focus on university students.

The main focus of this research is to determine the financial risk tolerance of each individual. Additionally, I aim to gauge if there are differences between 1. Singaporean

and Finnish students and 2. females and males. To conclude, the research questions are as follows:

1. Does the financial risk tolerance differ between Finnish and Singaporean university students?
2. Do females and males have different financial risk tolerance profiles?

The first question was developed by the help of the Cushion Hypothesis, which aims to explain some of the differences between a collectivistic and an individualistic country when it comes to risk-taking. The Cushion Hypothesis proposes that people from collectivistic countries can be more risk-seeking as they have a 'cushion', i.e. their family, to support if something fails (Weber & Hsee, 1999). Hence, as Singapore is a collectivistic country and Finland is an individualistic country, there might be differences when it comes to financial risk tolerance (www.hofstede-insights.com).

For the second research question, the Expected Utility Theory introduced the concept of risk aversion, which has been tested against gender on multiple occasions. However, many researches on the topic have had different results. Some studies argue that Asian women are as confident with risk-taking than men (Hewlett, Turner Moffitt & Marshall, 2014). In addition, it is suggested that women in Singapore take more risk than men (*Singapore Investor Attitudes Index*, 2012). On the other side, in some studies, men reported a higher financial risk tolerance (Grable, 2000; Deo & Sundar, 2015). As the studies have controversial results, gender was chosen as a variable in order to see if females and males have different financial risk tolerances in this study.

3. METHODOLOGY

A survey created by Grable and Lytton was used to determine the risk tolerance of university students from two countries: Finland and Singapore.

3.1. Research objectives

This research has five main objectives that are linked to exploring cultural and gender differences in risk tolerance. The study chose to focus on risk tolerance, a part of a risk profile, to gain a better understanding of it. For example, Manulife, a Canadian insurance and financial services company, includes investment goals, investor

knowledge, risk tolerance and investor type in their assessment of a risk profile (*Manulife Insurance*, n.d.). Out of these four, previous studies have shown that there might be cultural and gender-specific differences when it comes to risk tolerance (Grable, 2000; Deo & Sundar, 2015). Hence, risk tolerance was chosen as the main focus of the investment risk profile to gain a better and more throughout understanding of it in relation to culture and gender.

The research objectives are stated as follows:

1. Explore the risk tolerance of Singaporean college students
2. Explore the risk tolerance of Finnish college students
3. Gauge if there are differences in the risk tolerance between the countries
4. Explore the risk tolerance of females
5. Explore the risk tolerance of males
6. Gauge if there are differences in the risk tolerance between the genders

As can be seen from the research objectives, one of the main aims of this research is to compare the Singaporean and Finnish university students. As mentioned earlier in the Literature Review, there are cultural differences when it comes to risk tolerance. Another main purpose of this research is to identify if females and males have a different risk tolerance score. As the males and females consist of two nationalities, the results may be different from earlier researches that have focused on researching individuals of the same nationality or nationalities within the same content.

3.2. Data collection, Population and Sample size

The data was collected through a questionnaire that was developed by Grable and Lytton. The respondents were Singaporean and Finnish university students of different faculties. The respondents females and males. The questionnaire yielded 67 responses with the following distribution:

Nationality	Gender	Total (n)	Total (%)
Finnish	Male	16	23.88%
Finnish	Female	20	29.85%
Total Finnish respondents		36	53.73%

Singaporean	Male	15	22.39%
Singaporean	Female	16	23.88%
Total Singaporean respondents		31	46.27%

Total respondents	67	100%
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Table 1. Summary of responses

As can be seen from the distribution, the respondents equally represent the two nationalities, the survey featuring slightly more Finnish respondents than Singaporean. Additionally, females and males represent both countries equally, with slightly more females than males in both countries. Overall, the distribution is quite equal.

The population is the youth in Finland and Singapore. The sample is taken from university students of Singapore and Finland, as many young people are present there. Even though some mature students might be present, a majority of students are of younger age, both at university and at this sample. In fact, 94% of the students in this sample are between the ages 20 and 24. The minimum sample size to compare each country and gender with each other is $n=30$, which will be the minimum sample size for all the tests as well.

3.2.1. Questionnaire Design and Pre-test

The study used Grable and Lytton's questionnaire for multiple reasons. First, as discussed in depth in the literature review, it has been tested on multiple occasions. Hence, it has been proved to test financial risk tolerance correctly. Secondly, it provides a set of 13 questions on risk tolerance, which allows to test risk tolerance in depth. Thirdly, the questionnaire and its design has been researched and compared with other similar questionnaires over time. As a result, Grable and Lytton's questionnaire seems to measure the objectives of this research well.

The questionnaire was pre-tested on a few students who gave feedback on the questionnaire. The pre-test respondents said that the test seemed valid and questions accurate. The response time taken was between 5-10 minutes, depending on whether the student was familiar with the Grable and Lytton's questionnaire or not.

The survey is divided into two parts. The first part asks seven questions about the demographics and financial knowledge. The demographics include the nationality, age, gender and if they are a current university student. Additional questions in part one include questions related to financial knowledge: the number of finance classes taken and how the student would classify their financial knowledge.

The second part of the survey includes 13 questions that were created by Grable and Lytton to measure risk tolerance. The questions include, among others, the respondent's attitude towards risk, how comfortable they are with investing, and how they would distribute their investments if given money.

For the last 13 questions, Grable and Lytton provide a scoring table for the risk tolerance results, hence, the points from each questions can be added for a total score. The higher the score, the higher level of risk tolerance, and vice versa (Yang, 2004). The other questions, such as demographics and financial knowledge, can be used to compare answers between different nationalities and genders and to see if financial knowledge affects the risk tolerance score.

3.2.2. Survey administration

The survey was sent to a total of 120 university students: 60 Singaporean and 60 Finnish university students. The survey was distributed individually to a sample of students through social media, such as Facebook. The response rate was 55.83%. The students were explained that the results will be used for a Bachelor's Thesis in Aalto University and that the results will be anonymous.

The study used convenience sampling. Some of the advantages of convenience sampling include the cheap price (or no price), as the respondents are easily accessible, particularly in an online survey spread over social media (*Convenience sampling, n.d.*). Secondly, convenience sampling technique might have a higher response rate, as the people contacted are easily accessible and some might know the researcher(s) personally. Thirdly, convenience sampling is easy to conduct and might save time, especially if the sample consists of multiple nationalities. Fourthly,

convenience sampling might get a better access to respondents (*Convenience sampling, n.d.*). For example, a simple random sample might have been more difficult to conduct as the schools do not generally make their students lists public.

One of the disadvantages of convenience sampling is that it might not produce results that can be generalized as the sample is non-random (*Convenience sampling, n.d.*). Secondly, the sample might include more respondents who are willing or interested in the survey in the first place. Hence, the results might be biased. For example, the survey was sent to more business majors than students from other majors. Hence, the students might have a better financial knowledge than other students. As for this research, the advantages of convenience sampling outweighed the disadvantages. Therefore, convenience sampling was used as the sampling method.

The survey used Webropol as its online survey tool. As the research included students from two countries, Finland and Singapore, an online survey is the most efficient tool for use as it allows to gather responses even from distance. Additionally, the survey was administered in English, as both countries citizens' are familiar with the language (either studying the language for years or being native speakers).

The survey was opened on 13th February, 2018, and closed on 26th February, 2018. As the survey was open for almost two weeks, students were given more time to reply. Additionally, reminders to reply the survey were sent after a week.

3.2.3. Coding the data

The data was coded to numbers to allow quantitative comparisons of data. For example, the gender, nationality and financial knowledge were coded in the following way:

1. Please select your gender.	2. Please select your nationality.	6. Have you taken any finance classes at your university or outside of it? How many?	7. How would you classify your level of financial knowledge (obtained through self-study, classes, experience, e.g.)?
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2	1	1	1
2	2	3	3
2	2	1	1
1	2	2	2
2	2	4	3
1 = Female 2 = Male	1 = Finnish 2 = Singaporean 3 = Other	1 = I have not taken any finance classes 2 = 1-2 classes 3 = 3-5 classes 4 = More than 5 classes	1 = Below average level of financial knowledge 2 = Average level of financial knowledge 3 = Above average level of financial knowledge

Table 2. An example of coded data in questions one, two, six and seven.

Grable and Lytton provide a scoring table for their questionnaire, which was used for this study. The scoring table can be used for the second part of the survey, which includes 13 questions related to risk tolerance. The points towards the total risk tolerance score are allocated accordingly (the full version in Appendix 2):

1. In general, how would your best friend describe you as a risk taker?
 - a. A real gambler (4p)
 - b. Willing to take risks after completing adequate research (3p)
 - c. Cautious (2p)
 - d. A real risk avoider (1p)
2. You are on a TV game show and can choose one of the following, which would you take?
 - a. \$1,000 USD in cash (1p)
 - b. A 50% chance at winning \$5,000 USD (2p)
 - c. A 25% chance at winning \$10,000 USD (3p)

d. A 5% chance at winning \$100,000 USD (4p)

3. You have just finished saving for a "once-in-a-lifetime" vacation. Three weeks before you plan to leave, you lose your job. You would:

a. Cancel the vacation (1p)

b. Take a much more modest vacation (2p)

c. Go as scheduled, reasoning that you need the time to prepare for a job search (3p)

d. Extend your vacation, because this might be your last chance to go first-class (4p)

Table 3. An example of how points are allocated to each risk tolerance question. See the Appendix 2 for the full point allocation on risk tolerance.

3.3. Data Analyses

3.3.1. Hypotheses

The hypotheses are the following:

A.	H0: Finnish university students do not have a significantly different risk tolerance than Singaporeans	H1: Finnish university students have a significantly different risk tolerance than Singaporeans
B	H0: Male university students do not have a significantly different risk tolerance than females	H1: Male university students have a significantly different risk tolerance than females
C.	H0: Level of financial knowledge does not have a positive relationship with risk tolerance	H1: Level of financial knowledge has a positive relationship with risk tolerance
D.	H0: Self-proclaimed level of financial knowledge does not have a positive relationship with risk tolerance	H1: Self-proclaimed level of financial knowledge has a positive relationship with risk tolerance

E.	H0: Financial knowledge does not have a positive relationship with self-proclaimed level of financial knowledge	H1: Financial knowledge has a positive relationship with self-proclaimed level of financial knowledge
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Table 4. Summary of the Hypotheses

Hypotheses A and B will be tested with T-tests for significant of differences, whereas C-E will be tested with correlation and regression tests. First, the tests and the differences between them will be explored. Secondly, the reasoning for each test chosen will be provided.

3.3.2. T-Test, Correlation and Regression: Explanation and Comparison

An independent samples T-test 'evaluates whether two means from two samples of the same dependent variable are significantly different from one another' (Plummer, 2014). The t-test has 6 assumptions, which will be addressed later. The goal of the T-test is to compare two groups with each other to see if their means differ at a significant level (Howard & Wright, 2008).

On the other hand, the first goal for correlation and regression is to explore whether 'two measurement variables are associated with each other', which is summarized in the P value (McDonald, n.d.). The second goal is to estimate 'the strength of the relationship between two variables', summarized with the r^2 value (McDonald, n.d.). The third goal is to find the 'equation of a line that fits the cloud of points' and using this equation as a prediction (McDonald, n.d.).

When comparing regression with correlation, 'regression allows you to predict one variable from other (not just say if there is an association)' (Howard & Wright, 2008). In addition, 'linear regression aims to fit a straight line to data for any value of x gives the best prediction of y' (Howard & Wright, 2008). Another main difference between correlation and regression is that in correlation, 'you sample both measurement variables randomly from a population, while in regression you choose the values of the independent variable' (McDonald, n.d.).

	T-test	Correlation	Regression
Purpose	'Assess if two group means differ significantly' (Howard & Wright, 2008)	'Strength and direction of the relationship between variables' (Howard & Wright, 2008)	'Prediction of one variable from knowledge of one or more variables' (Howard & Wright, 2008)

Table 5. Summary of the t-test, correlation and regression purposes

3.3.2.1. Reasoning for each test chosen

Knowing these differences in the tests, the tests were chosen based on which test would best fulfill the purposes of the hypothesis. As can be seen from the hypotheses A and B, the hypotheses' objectives are to see if the risk tolerance scores differ significantly from each other (either by nationality or gender). Hence, the objective is to compare the means of the two groups to see for differences. Hence, a T-test seems to be the best fit for this objective. Therefore, hypotheses A and B will use T-tests as the objective is to measure for the differences in responses of each category (female/male or Singaporean/Finnish).

On the other hand, the hypotheses C-E are interested in the relationship between the two variables in question. As mentioned above, correlation measures the strength of a relationship between two variables. As this was one of the objectives of hypotheses C-E, correlation was used to determine how strong the relationship is and whether it is negative or positive. Regression, on the other hand, allows for predictions and further explorations of the relationship. In specific, the regression can be used to explore whether the independent variables can predict the dependent variables. Hence, in addition to exploring the relationship, a regression test will be conducted to further explore the relationships, in particular the possible predictions of another variable.

For hypothesis C, the second objective besides correlation is to further explore the relationship between financial knowledge (the number of finance classes taken, independent variable) and risk tolerance score (dependent variable). The objective is to see how much the variability in risk tolerance is explained by the number of finance

classes taken and whether the number of finance classes can predict the risk tolerance score at a significant level.

For hypothesis D, the relationship between the self-proclaimed level of financial knowledge and the risk tolerance score, is explored with regression in addition to correlation, as for the hypothesis C. The main objective is to see if the self-proclaimed level of financial knowledge (independent variable) can predict risk tolerance score (dependent variable).

For hypothesis E, the regression tests' objective is to explore the relationship between the level of financial knowledge (number of finance classes taken) and the self-reported level of financial knowledge, to see if the number of finance classes (independent variable) can predict the self-reported level of financial knowledge (dependent variable) at a significant level.

Based on the objectives and reasoning explained above, an independent T-test will be conducted for hypotheses A and B, and correlation and regression tests will be conducted for hypotheses C, D and E.

3.3.3. Independent T-tests for significance of differences

With independent T-test, there are 6 assumptions, which will be addressed below.

Assumption	Fulfilment
1: Dependent variable measured on a continuous scale	Pass - the financial tolerance score is measured on a continuous scale
2: Independent variable consists of two categorical, independent groups	Pass - the groups are Finnish/Singaporean or female/male
3: Independence of observations	Pass - no student belongs to more than one group in each t-test
4: No significant outliers	Pass –Q1, Q3, IQR, Lower Upper Bound and Lower Bound tested, no outliers found

5: Dependent variable should be approximately normally distributed for each group of the independent variable	Pass –the data seems to be slightly skewed to the right, however, still within the approximately symmetric range
6: Homogeneity of variances	Depends on the Hypothesis Hypothesis A–the data’s significance value (p-value) is $0.122 > 0.05$, hence, group variances can be treated as equal and assumption of homogeneity of variances has not been violated. Hypothesis B –fail, the p-value is $0.005 < 0.05$, hence, they cannot be treated as equal and the assumption is violated. Therefore, this Hypothesis will use results on the table under ‘Equal variances not assumed’, and thereof must adjust for the standard error of the estimate and for the degrees of freedom

Table 6. Summary of t-test assumptions

As the six assumptions have all been passed for Hypothesis pair A, it is allowed to conduct an independent T-test with the data. For Hypothesis pair B, all assumptions are passed with an exception of assumption 6: Homogeneity of variances. Hence, the Hypothesis will use the results on the table under ‘Equal variances not assumed’ to fix this.

The T-tests will use the risk tolerance score, which is the total score obtained from questions 8-20. The scoring is done according to Grable and Lytton’s instructions on point allocation (Appendix 2). As instructed, questions 16 and 17 were combined and an average score of those was used.

Confidence Level and Level of Significance

As for the confidence level, there is ‘no scientific basis for this choice’ (Lehmann & Romano, 2005, cited in Kim, 2015). However, the standard seems to be to set the level of significance to 0.05, while 0.01 and 0.10 are also common (Kim & Ji, 2015). The

conventional level of significance, 0.05, is based on Fisher's argument that 'one in twenty chance is a reasonable criterion for unusual sampling occurrence' (Moore & McCabe, 1993, cited in Kim, 2015: 6).

Some argue that this level cannot be applied to massive samples but is rather applicable to small sample sizes (Keuzenkamp & Magnus, 1995, cited in Kim & Ji, 2015). Hence, it is suggested that with larger sample sizes, Bayesian methods of Hypothesis Testing should be used as an alternative (Neal, 1987, Connolly, 1989/1991, cited in Kim & Ji, 2015). Instead of using the conventional level of significance, 'the Bayesian method of significance is based on the posterior odds ratio in favour of the alternative Hypothesis (H_1) over the null (H_0)' (Kim & Ji, 2015: 7).

Kim and Jiu (2015) tested this with two sample sizes, one small sample with 100 responses and one big sample with 2000 responses. Their results indicate that when one has a large sample size, 'the level of significance should be set at a much lower level than the conventional ones' (Kim & Jiu, 2015: 11). However, as the sample size of this study is 67, the conventional level of significance of 0.05 seems to fit the purposes of the Thesis. Additionally, in finance research, the conventional level of significance, 0.05, is 'almost exclusively used' (Kim & Jiu, 2015: 25). In the end, the confidence level of 95%, level of significance of 0.05, was chosen for the hypotheses.

Hypothesis pair A

The first T-test for the significance of differences will be for Hypothesis pair A:

H0: Finnish university students do not have a significantly different risk tolerance than Singaporeans
--

H1: Finnish university students have a significantly different risk tolerance than Singaporeans

Test A's first variable is the Finnish university students and second variable is the Singaporean university students. The confidence level is 95%, based on the reasoning mentioned above. If the T-test cannot reject Hypothesis H0, there are no significant differences between the variables in question.

Hypothesis pair B

The second T-test for the significance of differences will be for Hypothesis pair B:

H0: Male university students do not have a significantly different risk tolerance than females
--

H1: Male university students have a significantly different risk tolerance than females

Test B's first variable is male university students and second variable is female university students. The confidence level is 95%. If the T-test cannot reject Hypothesis H0, there are no significant differences between the variables in question.

3.3.4. Correlation Tests

Hypothesis pair C

The third hypothesis pair will use a correlation test to explore the relationship between the level of financial knowledge and financial risk tolerance score.

H0: Level of financial knowledge does not have a positive relationship with risk tolerance
--

H1: Level of financial knowledge has a positive relationship with risk tolerance
--

The first variable for the test is financial risk tolerance score. For the level of financial knowledge, the study will use question on how many finance classes a person has taken (question 6).

Hypothesis pair D

The fourth hypothesis pair will use a correlation test as well. The main goal of the correlation test is to explore the relationship between the variables. The hypotheses are as follows:

H0: Self-proclaimed level of financial knowledge does not have a positive relationship with risk tolerance
--

H1: Self-proclaimed level of financial knowledge has a positive relationship with risk tolerance
--

The first variable used is the financial risk tolerance score. The second variable used is the self-reported level of financial knowledge (question 7).

Hypothesis pair E

The fifth hypothesis pair will use a correlation test. The main goal is to explore the relationship between the self-proclaimed level of financial knowledge and level of financial knowledge. The hypotheses are as follows:

E.	H0: Financial knowledge does not have a positive relationship with self-proclaimed level of financial knowledge	H1: Financial knowledge has a positive relationship with self-proclaimed level of financial knowledge
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The variable of self-proclaimed level of financial knowledge is question 7, where respondents could indicate their level of financial knowledge as above average, average, or below average. For the level of financial knowledge, the number of finance classes will be used (question 6).

3.3.5. Regression Tests

For regression tests, a simple linear model will be used. For this model, there are five (5) Gauss-Markov assumptions which will be addressed below. The assumptions and the table are adopted from Wooldridge (2005), cited in Schwarz (2011).

Assumption
1: Linear in parameters
2: Random sampling of observations (n)
3: Sample variation in explanatory variables, where x's are not all the same value
4: Zero conditional mean: the error has an unexpected value of 0, given any values of the explanatory variable
5: Homoscedasticity: error has the same variance given any value of the explanatory variable

Table 7. Summary of the Gauss-Markov assumptions

When these five assumptions are fulfilled, 'the OLS estimator is the **best**, linear,

unbiased estimator of the true parameters β_j , conditional on the sample values of the explanatory variables' (Schwarz, 2011). Hence, the OLS estimator is called 'BLUE' (Schwarz, 2011).

Hence, estimations of how some of these assumptions may be fulfilled are addressed. The first assumption is that the parameters are linear, which seems to hold true. The second assumption focuses on the 'random sampling of observations (n)', which might be violated as the study uses a non-random sampling technique, convenience sampling (Wooldridge, 2005, cited in Schwarz, 2011). The fifth assumption, homoscedasticity, was tested with residuals. However, the residuals do not seem to have completely constant variance. To further explore this, a Goldfeld-Quandt test or a Breusch-Pagan test should be pursued (Schwarz, 2011).

If a relationship is proved, the regression test can further analyze the relationship between:

1. Financial risk tolerance score and financial knowledge
2. Financial risk tolerance score and self-proclaimed financial knowledge
3. Self-proclaimed level of financial knowledge and financial knowledge

The regression tests will be used for Hypothesis pairs C, D and E. The same hypotheses are used as above. For the financial knowledge, the number of finance classes taken will be used (question 6).

3.4. Limitations

Naturally, this study has limitations as well. One of the limitations is the use of convenience sampling. Due to this, the results might be different if a different method, example given simple random sampling, was used. For example, due to the convenience sampling, the study was mainly sent to business students. Hence, they may be over-represented compared to the millennial generation as a whole. Secondly, the sample size of the study is quite small. Thus, a bigger sample size could yield different and more accurate results. Thirdly, the study focuses on investigating the financial risk tolerance attitudes of the youth. However, the sample consisted of

university students only, which can affect the results as their financial knowledge might be greater than average population's. Next, we will discuss the findings of this survey.

4. FINDINGS

4.1. Response Rate

The survey was sent to a total of 120 university students: 30 Singaporean male students, 30 Singaporean female students, 30 Finnish male students and 30 Finnish female students. The study yielded a total of 67 responses. The survey was distributed individually to a sample of students through social media, such as Facebook. The response rate is as follows:

Response rate	
Overall (of total 120 students)	55.83%

Out of the 67 responses, 36 were females and 31 males. Hence, the response rate was slightly higher among females than males. Also, 36 of the responses were Finnish university students and 31 were Singaporean. Therefore, the Finnish students had a slightly higher response rate than Singaporean students. The genders are equally represented in both nationalities. The exact distribution of each gender within nationality can be seen from Table 1 under 3.2. Data collection (p. 20).

The response rate was decent as somewhat over half of the students replied the survey. The relatively high response rate for an online survey was probably partially due to convenience sampling. A second factor that might have affected the high response rate is the survey time. The survey was open for almost two weeks, which allowed the students enough time to reply.

4.2. Descriptive statistics

Some questions and/or options were shortened for clarity. The full questions can be seen in Appendix 1. In this part, the charts will be shown only for the main variables of interest: gender, nationality, financial knowledge and total risk tolerance scores. The distribution of responses to every question, including risk tolerance questions, can be found in Appendix 3. The point allocation for the risk tolerance questions for a total score is available at Appendix 2.

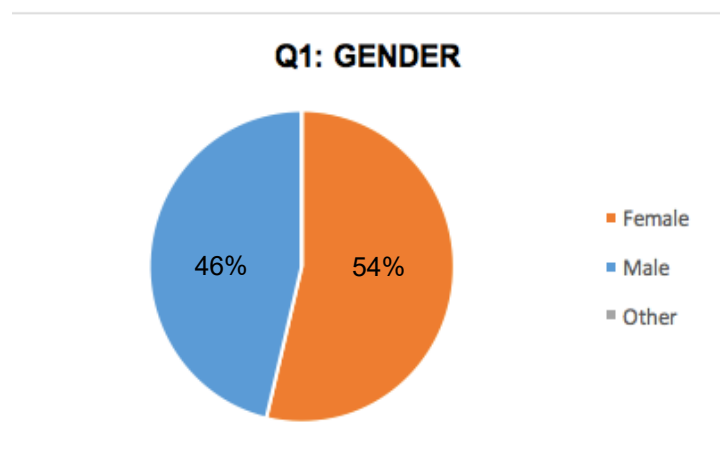


Chart 1. Summary of Q1 responses

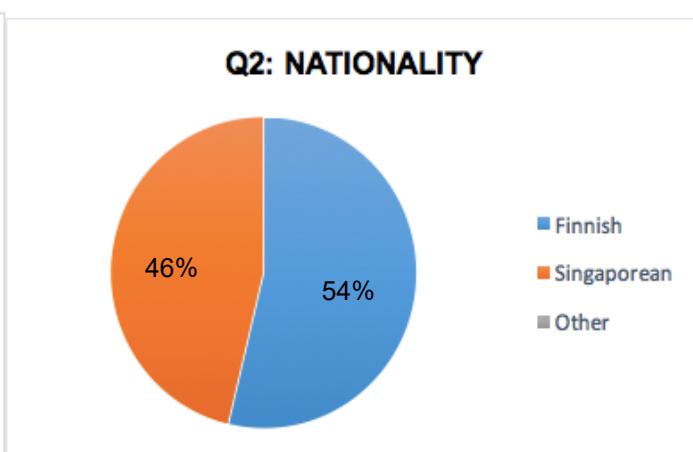


Chart 2. Summary of Q2 responses

As can be seen from chart 1, 54% of the respondents were females and 46% were males. Chart 2, on the other hand, shows that 54% of the respondents were Finnish and 46% were Singaporean.

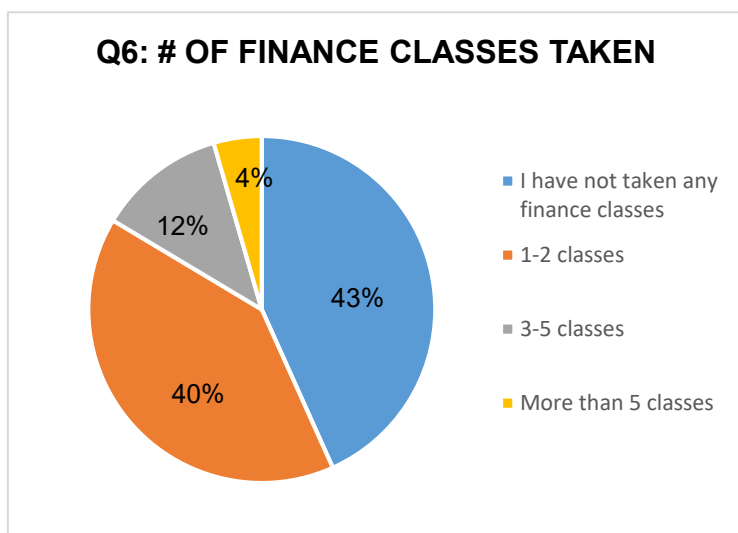


Chart 3. Summary of Q6 responses

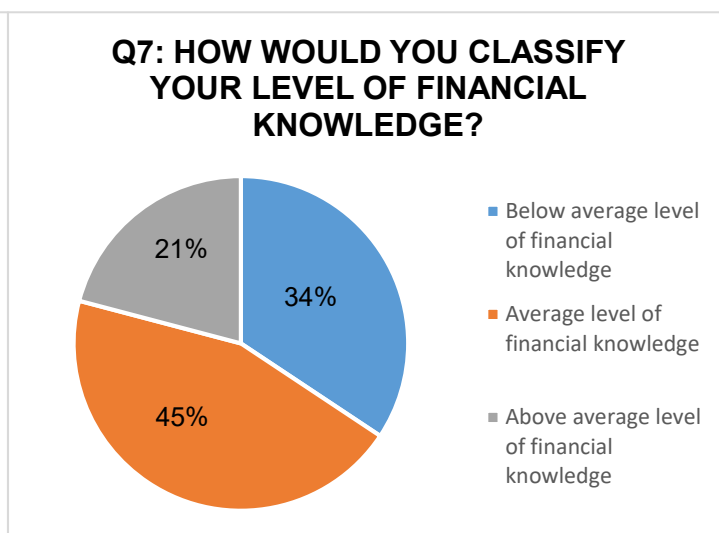


Chart 4. Summary of Q7 responses

As can be seen from the results of question 6, 40% of the respondents have taken 1-2 finance classes. In fact, 57% of the students have taken at least one finance class. Nevertheless, 43% of the students surveyed have not taken any finance classes. Only a minority, 4%, have taken more than five classes. 66% of the respondents classified their financial knowledge as above average or average level of financial knowledge in question 7. This might be somewhat correlated with the majors, as business majors might have taken more finance classes and hence have a higher level of financial

knowledge. However, 34% of the respondents said they have a below average level of financial knowledge.

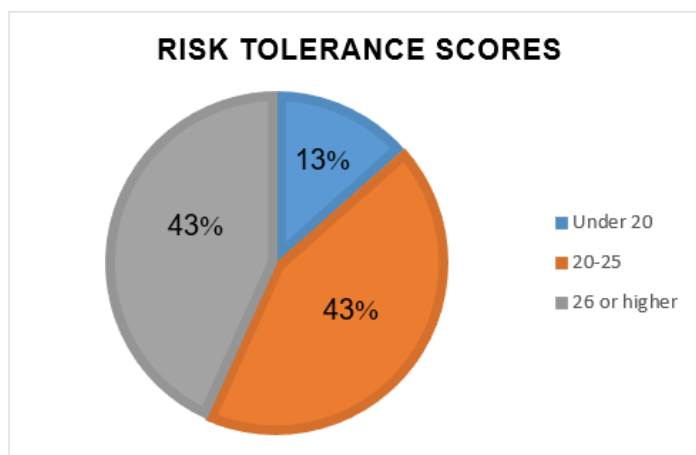


Chart 5. Summary of the risk tolerance scores

Based on the risk tolerance questions (questions 8 to 20), a financial risk tolerance score was calculated. The point allocation can be found in Appendix 2. The average score is 24.75. As can be seen from the chart 5, the score is usually somewhere between 20-25 or 26 or higher. The highest score was 35.5 whereas the lowest score was 18 points. A higher score indicates higher risk tolerance.

The risk tolerance distribution for each of the groups (Finnish/Singaporean or male/female) is as follows:

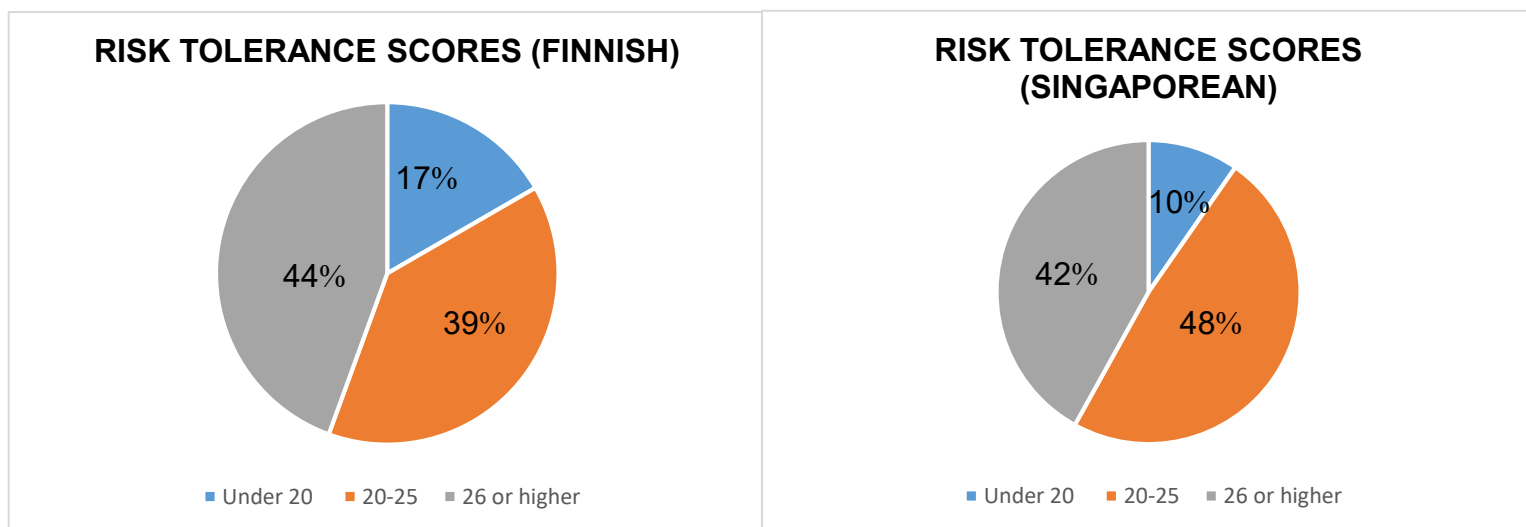


Chart 6. Summary of Finnish risk tolerance scores Chart 7. Summary of Singaporean risk tolerance scores

As can be seen from the charts, the Finns had slightly higher risk tolerance scores. 44% of the Finnish respondents had a score of 26 or higher, 39% had a score between 20-25 and 17% had a score under 20. The average for Finns was 25.1. The lowest score was 18 and highest 35.5. Of the Singaporeans, 48% had a score between 20-25 and 42% had a score of 26 or higher. 10% had a score under 20 points. The average score for Singaporeans was 24.3, which is somewhat lower than the Finnish average. The lowest score was 18 and the highest score was 33.5.

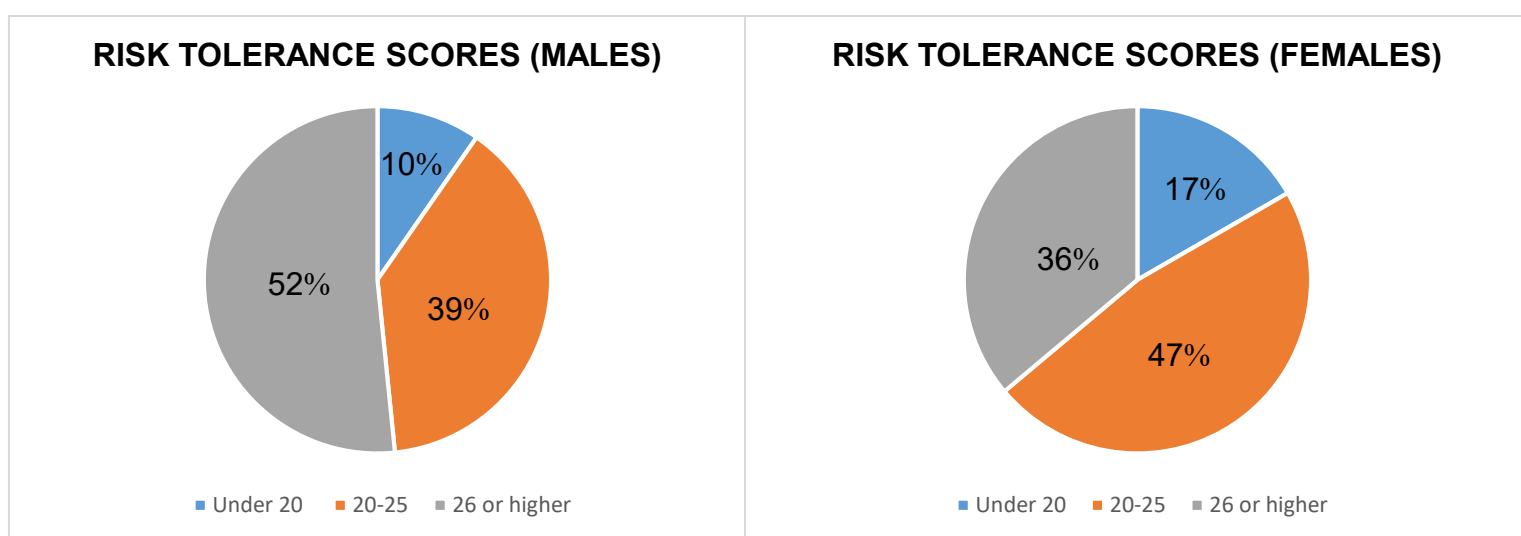


Chart 8. Summary of males' risk tolerance scores Chart 9. Summary of females' risk tolerance scores

52% of the male respondents had a risk tolerance score of 26 or higher. 39% had a score between 20-25 and only 10% had a score under 20. The average was 26.2, lowest score was 18 and the highest score was 35.5, which was also the highest score of the whole study. For the females, 47% had a score between 20-25. When looking at scores of 26 or higher, 36% of the females had this score, which is 16% lower than the percentage of males within that score range. 17% of the females had under 20 points, compared with 10% of the males. The average score for females was 23.5, the lowest score was 18 and the highest score was 28.5. As it is evident from the results, females had lower financial risk tolerance scores. Hence, a t-test will be a satisfactory measurement to further explore these differences, both cultural and gender-specific.

5. DISCUSSION AND ANALYSIS

5.1. Finnish vs. Singaporean: T-test

Test Pair A Hypotheses:

H0: Finnish university students do not have a significantly different risk tolerance than Singaporeans
H1: Finnish university students have a significantly different risk tolerance than Singaporeans

As mentioned earlier, the first variable is the Finnish university students and the second variable is the Singaporean university students. The total risk tolerance score will be used, which is counted from questions 8 to 20 according to the point allocation principles (available at Appendix 2). To review, the descriptive statistics for each variable are as follows:

Risk tolerance scores	Nationality	Mean	Median	Mode	Standard Deviation	Standard Error	N
	Finnish	25.11	24.5	28.5	4.65	0.77	36
	Singaporean	24.34	24.5	25.5	3.69	0.66	31

Table 8. Summary of Pair A variables' descriptive statistics

As mentioned under 3.3.3. Independent T-tests for significance of differences (p. 28), all assumptions have been passed for Test A. As the data's significance value (p-value) is $0.122 > 0.05$ in Levene's Test for Equality of Variances, group variances can be treated as equal. Hence, an independent T-test can be conducted. The confidence level is 95%, which equals to $\alpha = 0.05$. If the T-test cannot reject Hypothesis H0, there are no significant differences between the variables in question. The p-value is $0.459 > 0.05$, hence, we must retain the null hypothesis. This means that we are 95% confident that there are no significant differences between Finnish and Singaporean youth.

Independent Samples T-test: Finnish vs. Singaporean				
	df	T Stat	P(T<=t) two-tail	T Critical two-tail
Equal Variances Assumed	65	0.745	0.459	1.998

Equal Variances Not Assumed	65	0.758	0.451	1.997
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Table 9. Summary of T-test pair A

5.2. Male vs. Female: T-test

Test Pair B Hypotheses:

H0: Male university students do not have a significantly different risk tolerance than females
H1: Male university students have a significantly different risk tolerance than females

Test B's first variable is male university students and the second variable is female university students. The summary of the descriptive statistics for these two variables is as follows:

Risk tolerance scores	Gender	Mean	Median	Mode	Standard Deviation	Standard Error	N
	Male	26.18	25.5	28.5	4.88	0.88	31
	Female	23.53	23.5	25.5	3.13	0.52	36

Table 10. Summary of Pair B variables' descriptive statistics

When the data was tested for Levene's Test for Equality of Variances, the p-value was $0.005 < 0.05$. Hence, they cannot be treated as equal. Therefore, this Hypothesis must use results on the table under 'Equal variances not assumed'. The confidence level is 95%, meaning an $\alpha = 0.05$, as in the previous test. As mentioned before, if the T-test cannot reject Hypothesis H0, there are no significant differences between the variables in question. The p-value is $0.012 < 0.05$, hence, the null hypothesis will be rejected. Thus, there are significant differences between males and females.

The t-test is tested as a two-tail test as according to research, Asian women are as confident with risk-taking as Asian men (Hewlett, Turner Moffitt & Marshall, 2014). Hence, as half of our female sample consists of Singaporeans, the t-test is conducted as a two-tail test. Additionally, Wasiuzzaman & Edalat (2016) found that Malaysian females have higher risk tolerance than Malaysian men. Hence, it is important to test

as a two-tail to consider both options, as the sample consists of both European and Asian females and males.

Independent Samples T-test: Male vs .Female				
	df	T Stat	P(T<=t) two-tail	T Critical two-tail
Equal Variances Assumed	65	2.682	0.009	1.997
Equal Variances Not Assumed	50	2.599	0.012	2.009

Table 11. Summary of T-test pair B

5.3. Correlation Analysis

For correlation analysis, the following guidelines are used (Wilson, n.d.):

r-value	Strength
-1.0 to -0.5 or 1.0 to 0.5	Strong
-0.5 to -0.3 or 0.3 to 0.5	Moderate
-0.3 to -0.1 or 0.1 to 0.3	Weak
-0.1 to 0.1	None or very weak

Table 12. Summary of r value guidelines

When the r is positive, there is a positive relationship between the variables. When the r is negative, there is a negative relationship between the variables. If $r = 0$, there is no relationship between the variables. When $r = 1$, there is a perfect positive correlation. When $r = -1$, there is a perfect negative correlation.

5.3.1. Level of financial knowledge and risk tolerance

Test pair C Hypotheses:

H0: Level of financial knowledge does not have a positive relationship with risk tolerance
H1: Level of financial knowledge has a positive relationship with risk tolerance

The variables for the correlation are the financial risk tolerance score and the level of financial knowledge. For the financial risk tolerance score, questions 8-20 are used and points allocated according to the guidelines by Grable and Lytton, as per usual. For the level of financial knowledge, the study will use the question on how many finance classes a person has taken (question 6).

The correlation for these two is 0.479, which indicates that a higher risk tolerance score correlates with a higher level of financial knowledge (i.e., a higher number of classes taken). The correlation is between 0.3 to 0.5, thus, there is a moderate, positive correlation. Therefore, the null hypothesis can be rejected.

	Number of finance classes taken	Risk tolerance score
Number of finance classes taken	1	
Risk tolerance score	0.479	1

Table 13. Summary of the correlation test C results

5.3.2. Self-proclaimed level of financial knowledge and risk tolerance

Test pair D Hypotheses:

The fourth hypothesis pair will use a correlation test as well. The main goal of the correlation test is to explore the relationship between the variables. The hypotheses are as follows:

H0: Self-proclaimed level of financial knowledge does not have a positive relationship with risk tolerance
H1: Self-proclaimed level of financial knowledge has a positive relationship with risk tolerance

The variables in this correlation test are the financial risk tolerance score and the self-reported level of financial knowledge (question 7). The respondents indicated their level of financial knowledge as above average, average, or below average. The $r = 0.433$, which indicates a moderate, positive relationship between self-proclaimed level of financial knowledge and risk tolerance score. Hence, we can reject the null hypothesis. The correlation is slightly lower than between test C, where correlation was 0.479. However, both test C and D indicate a moderate, positive correlation between the variables.

	Self-proclaimed level of financial knowledge	Risk tolerance score
Self-proclaimed level of financial knowledge	1	
Risk tolerance score	0.433	1

Table 14. Summary of the correlation test D results

5.3.3. Self-proclaimed level of financial knowledge and financial knowledge

Test pair E Hypotheses:

E.	H0: Financial knowledge does not have a positive relationship with self-proclaimed level of financial knowledge	H1: Financial knowledge has a positive relationship with self-proclaimed level of financial knowledge
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The variable used for self-proclaimed level of financial knowledge is question 7. In this question, the respondents could indicate their level of financial knowledge as above average, average, or below average. For the level of financial knowledge, the number of finance classes will be used (question 6). The $r = 0.668$, which indicates a strong, positive relationship between self-reported level of financial knowledge and the number of finance classes taken. Hence, the null hypothesis can be rejected.

	Self-proclaimed level of financial knowledge	Number of finance classes taken
Self-proclaimed level of financial knowledge	1	
Number of finance classes taken	0.668	1

Table 15. Summary of the correlation test E results

5.4. Regression Analysis

As the correlations showed a positive relationship for tests C, D, and E, these relationships will be analyzed further with regression tests. The objective is to analyze the relationship between:

1. Financial risk tolerance score and financial knowledge
2. Financial risk tolerance score and self-proclaimed financial knowledge
3. Self-proclaimed level of financial knowledge and financial knowledge

Hence, the regression tests will be used for Hypothesis pairs C, D and E. A Simple Linear Regression will be used.

5.4.1. Level of financial knowledge and risk tolerance

The first regression test explores the relationship between level of financial knowledge (number of finance classes taken) and risk tolerance score. The independent variable, x, will be the number of finance classes taken. The dependent variable, y, will be the risk tolerance score. The R Square value is 0.229, which indicates that 22.9% of variability in risk tolerance score is explained by the number of finance classes taken. Furthermore, the p-value is $0.00004 < 0.05$ (alpha), which indicates that the number of finance classes predicts the risk tolerance score at a significant level.

Regression statistics	
Multiple R	0.479
R Square	0.229

Adjusted R Square	0.217
Standard Error	3.373
N	67

Table 16. Summary of the Regression Statistics for pair C

ANOVA			
	df	F	Significance F
Regression	1	19.338	0.00004
Residual	65		
Total	66		

Table 17. Summary of the ANOVA results for pair C

	Coefficients	Standard Error	t Stat	P-value
Intercept	20.442	1.081	18.906	4E-28
Number of finance classes taken	2.428	0.552	4.398	0.00004

Table 18. Summary of the results for pair C.

5.4.2. Self-proclaimed level of financial knowledge and risk tolerance

The second regression test will explore our second objective, which is to further explore the relationship between the self-reported level of financial knowledge (above average/average/below average) and the financial risk tolerance score. The independent variable, x , will be the self-proclaimed level of financial knowledge. The dependent variable, y , will be the risk tolerance score. The R Square value is 0.188, which indicates that 18.8% variability in risk tolerance score is explained by the self-reported level of financial knowledge. Additionally, the p-value is $0.00025 < 0.05$, which indicates that the relationship is indeed significant.

Regression statistics	
Multiple R	0.433

R Square	0.188
Adjusted R Square	0.175
Standard Error	3.829
N	67

Table 19. Summary of the Regression Statistics for pair D

ANOVA			
	df	F	Significance F
Regression	1	15.022	0.00025
Residual	65		
Total	66		

Table 20. Summary of the ANOVA results for pair D

	Coefficients	Standard Error	t Stat	P-value
Intercept	20.126	1.282	15.694	8.61E-24
Self-proclaimed level of financial knowledge	2.481	0.640	3.876	0.00025

Table 21. Summary of the results for pair D

5.4.3. Level of financial knowledge and self-proclaimed level of financial knowledge

The third and last regression test will explore the third objective, i.e. the relationship between the level of financial knowledge (# of finance classes taken) and the self-reported level of financial knowledge. The independent variable, x, will be the number of finance classes taken, also known as, level of financial knowledge. The dependent variable, y, will be the self-proclaimed level of financial knowledge. The R Square value is 0.446, which indicates that 44.6% variability in self-reported level of financial knowledge is explained by the number of finance classes taken (level of financial knowledge). In addition, the p-value is $6.784E-10 < 0.05$, which indicates that the

relationship is significant between number of finance classes taken and self-proclaimed level of financial knowledge.

Regression statistics	
Multiple R	0.668
R Square	0.446
Adjusted R Square	0.437
Standard Error	0.552
N	67

Table 22. Summary of the Regression Statistics for pair E

ANOVA			
	df	F	Significance F
Regression	1	52.280	6.784E-10
Residual	65		
Total	66		

Table 23. Summary of the ANOVA results for pair E

	Coefficients	Standard Error	t Stat	P-value
Intercept	0.816	0.160	5.093	3.253E-06
Number of finance classes taken	0.591	0.082	7.230	6.784E-10

Table 24. Summary of the results for pair E

6. CONCLUSIONS

6.1. Main Findings

The main findings of this research are linked to culture, gender and financial knowledge. First, there are no significant differences between the risk tolerance of Singaporeans and Finns. This may be conflicting as previous research indicates that Asians tend to be more risk-tolerant. According to Fan and Xiao (2006), the Chinese are more risk tolerant than Americans. Additionally, Malaysian female university students have higher financial risk tolerance than their male counterparts

(Wasiuzzaman & Edalat, 2016). In fact, it is suggested that Asian women are as confident with risk-taking as Asian men (Hewlett, Turner Moffitt & Marshall, 2016).

Moreover, a report states that Singaporean women take more risk than men (*Singapore Investor Attitudes Index*, 2012). Despite this, there have been no previous comparisons between Finland and Singapore, hence, the results can be different due to the country selection. In fact, Singapore may differ from its Asian counterparts in this regard, even though it is defined to be as collectivistic as a country as China, which is proposed to affect risk tolerance (www.hofstede-insights.com, n.d.; Weber & Hsee, 1999).

The second main finding of this research is that there are significant differences between females and males risk tolerance. The gender differences have yielded controversial results earlier, where some studies found significant differences and some did not (Deo & Sundar, 2015; Badunenko et al., 2010). Deo and Sundar (2015) report that Indian men are more willing to take above average risk whereas few women were willing to take medium risk. Other studies also confirm that men seem to have a higher financial risk tolerance (Grable, 2000; Deo & Sundar, 2015; Khan, 2017). Khan (2017) used the SCF model and the questionnaire developed by Grable and Lytton. This study used the latter questionnaire and confirmed similar results.

However, the gender differences might be linked to cultural differences, as different results are achieved in different countries. As mentioned earlier, it is suggested that Malaysian female students have higher financial risk tolerance than the males (Wasiuzzaman & Edalat, 2016). Based on the findings of this study, this does not seem to apply to Singaporeans. Nevertheless, as the female and male groups consisted of both Finnish and Singaporean students, the results may be different if the group had consisted of only Singaporean female or male students, not a mix of Singaporean and Finnish students. Hence, for a future research, a larger sample could be used in order to acquire the minimum sample size to compare each country's females and males as their own sub-group.

On the other hand, financial knowledge might affect the gender results. Deo and Sundar (2015) report that men trade more actively than women, and hence, they might

gain more financial knowledge. Whereas men are often stated to be over-confident and make riskier decisions, women are more likely to consult an advisor when making investment decisions (Barber & Odean, 2001; Deo & Sundar, 2015).

In fact, this Thesis' study found more information on financial knowledge and how it is linked to financial risk tolerance. Firstly, the number of finance classes predicts the risk tolerance score at a significant level. Secondly, the relationship between the self-proclaimed level of financial knowledge and risk tolerance is significant. Thirdly, the relationship is significant between the number of finance classes taken and the self-proclaimed level of financial knowledge. Hence, this study confirms that financial knowledge tends to correlate with risk tolerance, which was also reported by other studies (Finke & Huston, 2003; Corter & Chen, 2006; Nguyen, 2017).

Three main limitations of this study are the sampling method, the sample size and the education level of the participants. First, the survey used convenience sampling, which means that the results might not be generalized over the population and might be biased (*Convenience sampling, n.d.*). In fact, even though Wasiuzzaman and Edalat (2016) reported that Malaysian female students have higher financial risk tolerance than the males, the relationship was later found to be insignificant. The authors also used convenience sampling, which might have affected the results (Wasiuzzaman & Edalat, 2016).

Secondly, the sample size of this study was only 67, which may be too small to yield results that can be generalized. In addition, the topic of the survey might have had its effect, too. As some of the questions might have seemed difficult for a person who has not taken any finance classes or has limited knowledge of the topic, they might not answer the survey, leading to a possibly biased sample.

A third limitation that might have affected the survey results is the education level of the respondents. Finke and Huston (2003) claim that investors with high school education are more willing to take higher risk than those with less than a high school diploma. As the sample of this survey consisted exclusively of university students, the results might have been different if the study included young people who have not finished high school education and entered university.

6.2. Implications for International Business

The results of this study can be applied in an international setting. First, differences in risk tolerance between different nationalities can be used by financial advisors. For example, investment portfolios can be differentiated for individuals from different cultures to adapt to their risk tolerances. The Cushion Hypothesis claims that people from collectivistic cultures, such as China, have higher risk tolerance than people from individualistic cultures (Weber & Hsee, 1999). In fact, multiple studies report that Asians tend to take more risk than US Americans (Weber & Hsee, 1999; Fan & Xiao, 2006).

However, this study found no significant differences between the risk tolerance scores of Finns and Singaporeans. Thus, Finnish financial advisors working in Singapore, or vice versa, can expect similar risk tolerances between the different clientele. Therefore, even though culture might occasionally affect risk tolerance, this might not always be true. As Singapore can be seen as a highly multicultural country, it may differ greatly from the rest of Asia. In addition, there are differences within continents as well. For example, differences were found between European countries (Badunenko et al., 2010). In fact, Alanko (2009) claims that Finnish investors are extremely risk averse. Hence, the investment portfolios can be adapted to fit different cultures and differences in risk tolerances.

When it comes to gender differences, this study reported significant differences between females' and males' risk tolerance scores, where men reported higher risk tolerance. In fact, the average risk tolerance score was 26.2 for males and 23.5 for females. Hence, financial advisors can adapt the portfolio differently for females and males. In addition, men are stated to trade more actively than women and to be over-confident (Barber & Odean, 2001; Deo & Sundar, 2015). Thus, males might be more interested in managing their own portfolio than women. As a matter of fact, women are more likely to consult an advisor when investing (Deo & Sundar, 2015). Hence, these differences could be taken into account in the marketing strategies of financial services. As suggested earlier, there might also be differences between females and

males in different countries, where some females might be more confident with risk-taking (Weber & Hsee, 1999).

In addition to risk tolerance, client-advisor relationships can differ between cultures. As some cultures have a higher power distance, the advisor is expected to communicate differently with the client. For example, Finland scores 33 on the power distance in comparison with Singapore which scores 74, meaning that a higher power distance exists in Singapore (www.hofstede-insights.com, n.d.). In Finland, communication is 'direct and participative' whereas in Singapore it is said to be indirect and there is a greater distance between people (www.hofstede-insights.com, n.d.). As a financial advisor, one should take these communication differences in account. In fact, 82% of the clients ranked interpersonal skills, such as communication skills and listening, as the most important personal qualities that an advisor can have (Sheils, n.d.). Hence, even though the risk tolerances may not differ significantly between the people of Singapore and Finland, one should communicate differently with the clientele and consider cultural communication differences carefully.

6.3. Suggestions for Further Research

Future researches can focus on different countries to further research the differences between risk tolerance and culture. In addition, with a bigger sample, one could explore differences between Singaporean females and Finnish females, as well as Singaporean males and Finnish males, which may yield different results than a group consisting of both nationalities. With a bigger sample, one might achieve more significant results. In addition, one could use a random sampling technique in the future, such as a simple random sample. Even though results can be achieved with convenience sampling as well, the sampling might lead to insignificant results (Wasiuzzaman & Edalat, 2016). In addition, when one uses a random sampling method, the results might be better generalized over the population.

Likewise, a different sample could be chosen. As the sample of this study consisted exclusively of university students, the results might be different if the sample had also included young people who have not entered a university and/or finished high school. In fact, Finke and Huston (2003) state that investors with high school education are

more willing to take higher risk than those with less than a high school diploma. Hence, a future study could use a sample consisting of young people from different backgrounds.

Furthermore, a future study can focus on a different part of the investment risk profile. This study focused exclusively on risk tolerance, however, another part could be researched in relation to culture. In addition, a study could use both models, the Survey of Consumer Finances and the questionnaire created by Grable and Lytton, to determine whether different nationalities provide different answers and whether risk tolerance scores differ between these two measurements. Khan (2017) used these two models in their study, however, the study focused exclusively on Pakistan. Thus, these two models could be compared in relation to cultural differences.

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8. APPENDICES

8.1. Appendix 1: Risk tolerance survey

Questionnaire: Financial risk tolerance

This survey is conducted by Elsa Huhtala at Aalto University, School of Business. The results are anonymous and will be used for a Bachelor's Thesis on financial risk tolerance. The participants should be citizens of either Singapore or Finland and be currently enrolled in a university.

1. Please select your gender.

- ☐ Female
- ☐ Male
- ☐ Other

2. Please select your nationality.

- ☐ Finnish
- ☐ Singaporean
- ☐ Other

3. Do you study at a university currently?

- ☐ Yes
- ☐ No

4. Which university and faculty do you belong to (e.g. Aalto University / Business)?

5. Please write your age in numbers.

6. Have you taken any finance classes at your university or outside of it? How many?

- ☐ More than 5 classes
- ☐ 3-5 classes
- ☐ 1-2 classes
- ☐ I have not taken any finance classes

7. How would you classify your level of financial knowledge (obtained through self-study, classes, experience, e.g.)?

- ☐ Above average level of financial knowledge
- ☐ Average level of financial knowledge
- ☐ Below average level of financial knowledge

Financial risk tolerance is measured with the questionnaire developed by Grable and Lytton (1999) in 'Financial risk tolerance revisited: The development of a risk assessment instrument', Financial Services Review; 8: 163-181.

8. In general, how would your best friend describe you as a risk taker?

- ☐ A real gambler
- ☐ Willing to take risks after completing adequate research
- ☐ Cautious
- ☐ A real risk avoider

9. You are on a TV game show and can choose one of the following, which would you take?

- ☐ \$1,000 USD in cash
- ☐ A 50% chance at winning \$5,000 USD
- ☐ A 25% chance at winning \$10,000 USD
- ☐ A 5% chance at winning \$100,000 USD

10. You have just finished saving for a "once-in-a-lifetime" vacation. Three weeks before you plan to leave, you lose your job. You would:

- ☐ Cancel the vacation
- ☐ Take a much more modest vacation
- ☐ Go as scheduled, reasoning that you need the time to prepare for a job search
- ☐ Extend your vacation, because this might be your last chance to go first-class

11. If you unexpectedly received \$20,000 to invest, what would you do?

- ☐ Deposit it in a bank account, money market account, or an insured CD
- ☐ Invest it in safe high quality bonds or bond mutual funds
- ☐ Invest it in stocks or stock mutual funds

12. In terms of experience, how comfortable are you investing in stocks or stock mutual funds?

- ☐ Not at all comfortable
- ☐ Somewhat comfortable

☐ Very comfortable

13. When you think of the word "risk," which of the following words comes to mind first?

- ☐ Loss
- ☐ Uncertainty
- ☐ Opportunity
- ☐ Thrill

14. Some experts are predicting prices of assets such as gold, jewels, collectibles, and real estate (hard assets) to increase in value; bond prices may fall, however, experts tend to agree that government bonds are relatively safe. Most of your investment assets are now in high interest government bonds. What would you do?

- ☐ Hold the bonds
- ☐ Sell the bonds, put half the proceeds into money market accounts, and the other half into hard assets
- ☐ Sell the bonds and put the total proceeds into hard assets
- ☐ Sell the bonds, put all the money into hard assets, and borrow additional money to buy more

15. Given the best and worst case returns of the four investment choices below, which would you prefer?

- ☐ \$200 USD gain best case; \$0 USD gain/loss worst case
- ☐ \$800 USD gain best case; \$200 USD loss worst case
- ☐ \$2,600 USD gain best case; \$800 USD loss worst case
- ☐ \$4,800 USD gain best case; \$2,400 USD loss worst case

16. In addition to whatever you own, you have been given USD \$1,000. You are now asked to choose between:

- ☐ A sure gain of USD \$500

☐ A 50% chance to gain USD \$1,000 and a 50% chance to gain nothing

17. In addition to whatever you own, you have been given USD \$2,000. You are now asked to choose between:

☐ A sure loss of \$500 USD

☐ A 50% chance to lose \$1,000 USD and a 50% chance to lose nothing

18. Suppose a relative left you an inheritance of \$100,000 USD, stipulating in the will that you invest ALL the money in ONE of the following choices. Which one would you select?

☐ A savings account or money market mutual fund

☐ A mutual fund that owns stocks and bonds

☐ A portfolio of 15 common stocks

☐ Commodities like gold, silver, and oil

19. If you had to invest \$20,000 USD, which of the following investment choices would you find most appealing?

☐ 60% in low-risk investments, 30% in medium-risk investments, 10% in high-risk investments

☐ 30% in low-risk investments, 40% in medium-risk investments, 30% in high-risk investments

☐ 10% in low-risk investments, 40% in medium-risk investments, 50% in high-risk investments

20. Your trusted friend and neighbor, an experienced geologist, is putting together a group of investors to fund an exploratory gold mining venture. The venture could pay back 50 to 100 times the investment if successful. If the mine is a bust, the entire investment is worthless. Your friend estimates the chance of success is only 20%. If you had the money, how much would you invest?

☐ Nothing

- ☐ One month's salary
- ☐ Three month's salary
- ☐ Six month's salary

8.2. Appendix 2: Point allocation to risk tolerance questions

The points are combined for a total score. The score can range from 11 points to 44 points, when combining and averaging the score for questions 16 and 17, as suggested.

8. In general, how would your best friend describe you as a risk taker?

- a. A real gambler (4p)
- b. Willing to take risks after completing adequate research (3p)
- c. Cautious (2p)
- d. A real risk avoider (1p)

9. You are on a TV game show and can choose one of the following, which would you take?

- a. \$1,000 USD in cash (1p)
- b. A 50% chance at winning \$5,000 USD (2p)
- c. A 25% chance at winning \$10,000 USD (3p)
- d. A 5% chance at winning \$100,000 USD (4p)

10. You have just finished saving for a "once-in-a-lifetime" vacation. Three weeks before you plan to leave, you lose your job. You would:

- a. Cancel the vacation (1p)
- b. Take a much more modest vacation (2p)
- c. Go as scheduled, reasoning that you need the time to prepare for a job search (3p)
- d. Extend your vacation, because this might be your last chance to go first-class (4p)

11. If you unexpectedly received \$20,000 USD to invest, what would you do?

- a. Deposit it in a bank account, money market account, or an insured CD (1p)
- b. Invest it in safe high quality bonds or bond mutual funds (2p)
- c. Invest it in stocks or stock mutual funds (3p)

12. In terms of experience, how comfortable are you investing in stocks or stock mutual funds?

- a. Not at all comfortable (1p)
- b. Somewhat comfortable (2p)
- c. Very comfortable (3p)

13. When you think of the word "risk," which of the following words comes to mind first?

- a. Loss (1p)
- b. Uncertainty (2p)
- c. Opportunity (3p)
- d. Thrill (4p)

14. Some experts are predicting prices of assets such as gold, jewels, collectibles, and real estate (hard assets) to increase in value; bond prices may fall, however, experts tend to agree that government bonds are relatively safe. Most of your investment assets are now in high interest government bonds. What would you do?

- a. Hold the bonds (1p)
- b. Sell the bonds, put half the proceeds into money market accounts, and the other half into hard assets (2p)
- c. Sell the bonds and put the total proceeds into hard assets (3p)
- d. Sell the bonds, put all the money into hard assets, and borrow additional money to buy more (4p)

15. Given the best and worst case returns of the four investment choices below, which would you prefer?

- a. \$200 USD gain best case; \$0 USD gain/loss worst case (1p)
- b. \$800 USD gain best case; \$200 USD loss worst case (2p)
- c. \$2,600 USD gain best case; \$800 USD loss worst case (3p)
- d. \$4,800 USD gain best case; \$2,400 USD loss worst case (4p)

16. In addition to whatever you own, you have been given USD \$1,000. You are now asked to choose between:

- a. A sure gain of USD \$500 (1p)
- b. A 50% chance to gain USD \$1,000 and a 50% chance to gain nothing (3p)

17. In addition to whatever you own, you have been given USD \$2,000. You are now asked to choose between:

- a. A sure loss of \$500 USD (1p)
- b. A 50% chance to lose \$1,000 USD and a 50% chance to lose nothing (3p)

18. Suppose a relative left you an inheritance of \$100,000 USD, stipulating in the will that you invest ALL the money in ONE of the following choices. Which one would you select?

- a. A savings account or money market mutual fund (1p)
- b. A mutual fund that owns stocks and bonds (2p)
- c. A portfolio of 15 common stocks (3p)
- d. Commodities like gold, silver, and oil (4p)

19. If you had to invest \$20,000 USD, which of the following investment choices would you find most appealing?

a. 60% in low-risk investments, 30% in medium-risk investments, 10% in high-risk investments (1p)

b. 30% in low-risk investments, 40% in medium-risk investments, 30% in high-risk investments (2p)

c. 10% in low-risk investments, 40% in medium-risk investments, 50% in high-risk investments (3p)

20. Your trusted friend and neighbor, an experienced geologist, is putting together a group of investors to fund an exploratory gold mining venture. The venture could pay back 50 to 100 times the investment if successful. If the mine is a bust, the entire investment is worthless. Your friend estimates the chance of success is only 20%. If you had the money, how much would you invest?

a. Nothing (1p)

b. One month's salary (2p)

c. Three month's salary (3p)

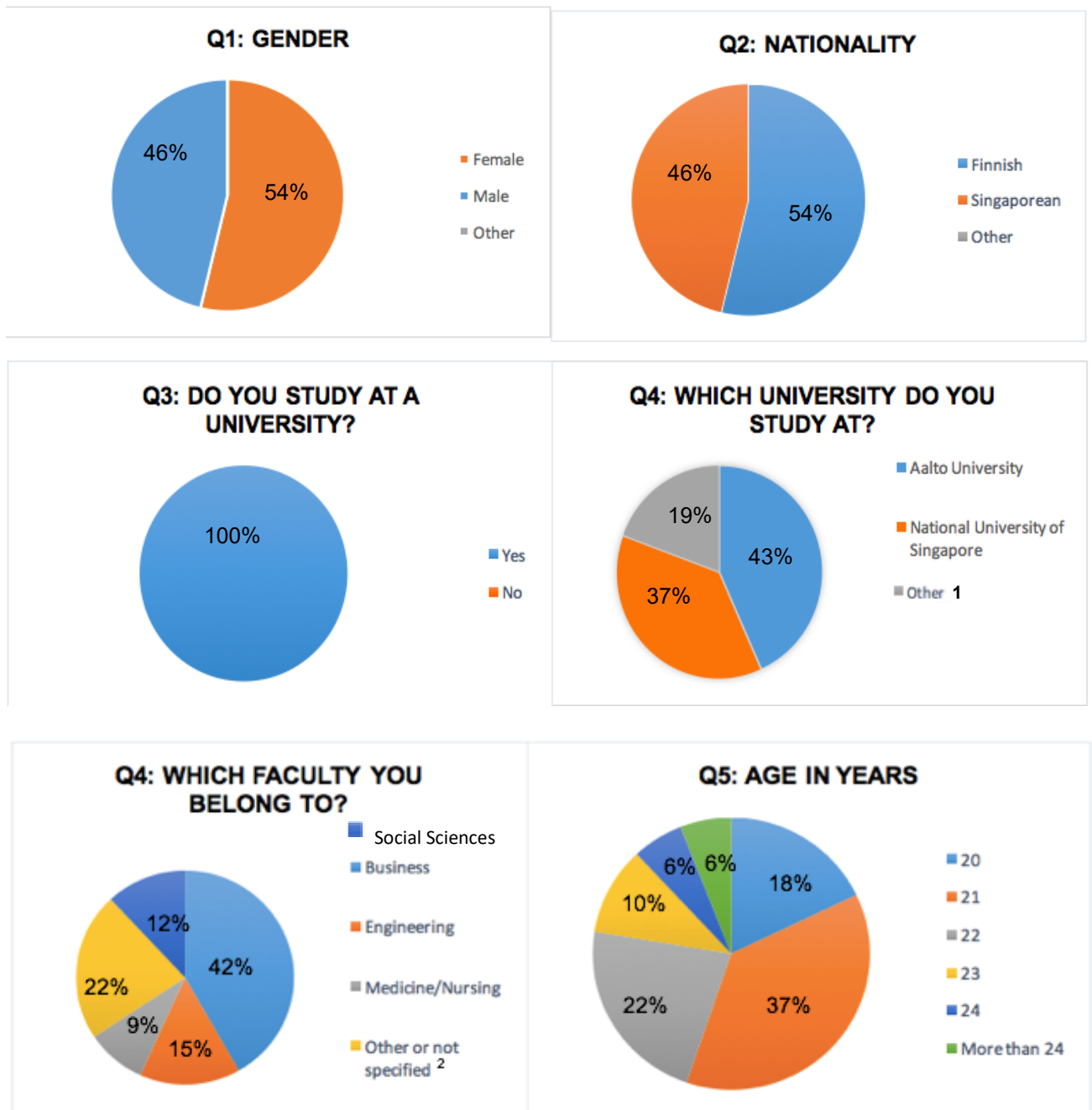
d. Six month's salary (4p)

Answers to questions 16 and 17 can be averaged to obtain a combined score. The risk tolerance questionnaire was developed by Grable and Lytton in:

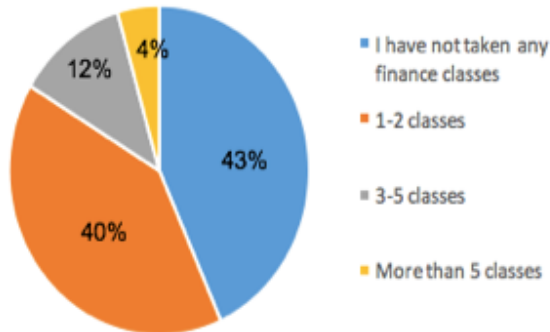
Grable, J., & Lytton, R. H. (1999). 'Financial risk tolerance revisited: The development of a risk assessment instrument'. Financial Services Review; 8: 163-181.

8.3. Appendix 3: Distribution of responses for every question in the survey

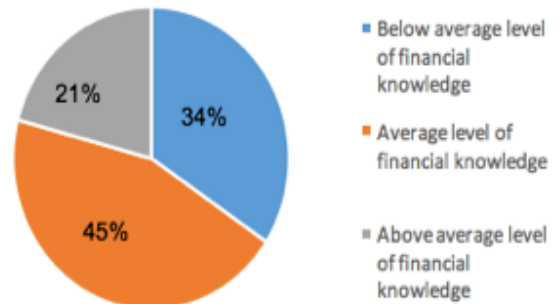
Some of these questions and/or answers were shortened for clarity, please see Appendix 1 for the full wording of the questions. When a number is indicated within the response options, please see notes for an additional explanation. There are two parts to question 4, which are addressed separately.



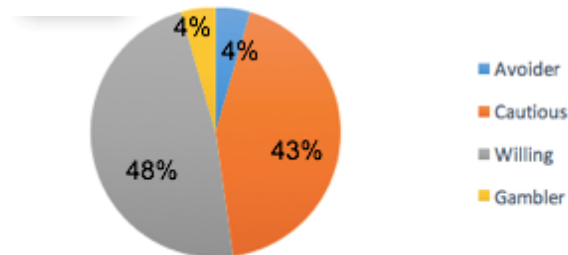
Q6: # OF FINANCE CLASSES TAKEN



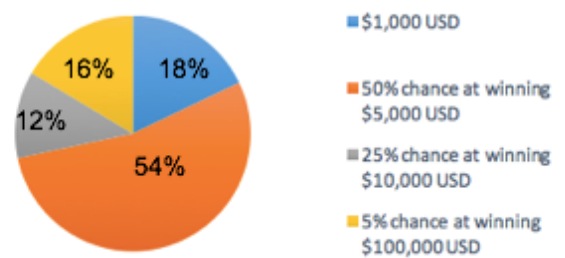
Q7: HOW WOULD YOU CLASSIFY YOUR LEVEL OF FINANCIAL KNOWLEDGE?



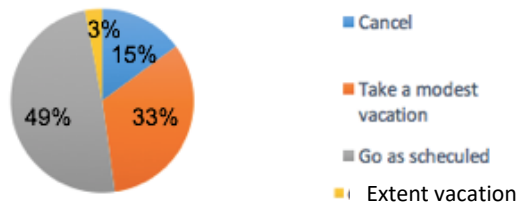
Q8: HOW WOULD YOUR BEST FRIEND DESCRIBE YOU AS A RISK TAKER?



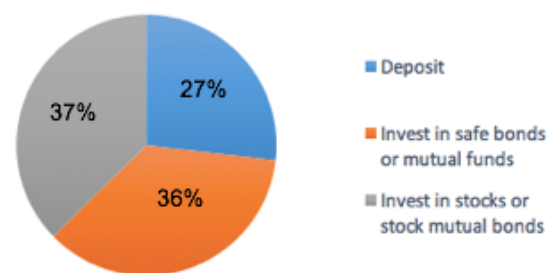
Q9: IF YOU WERE ON A TV SHOW, WHICH ONE WOULD YOU TAKE?



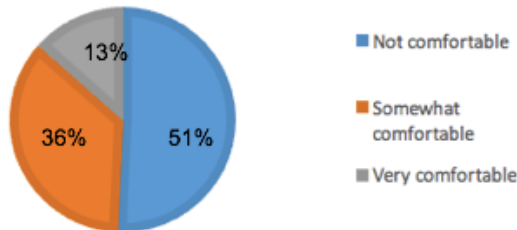
Q10: YOU HAVE SAVED FOR A ONCE-IN-A-LIFETIME VACATION. YOU LOSE YOUR JOB. WHAT DO YOU DO?



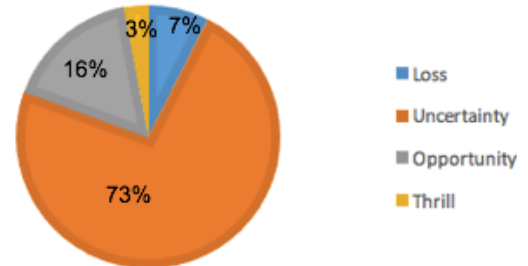
Q11: IF YOU RECEIVED 20,000 USD TO INVEST, WHAT WOULD YOU DO?



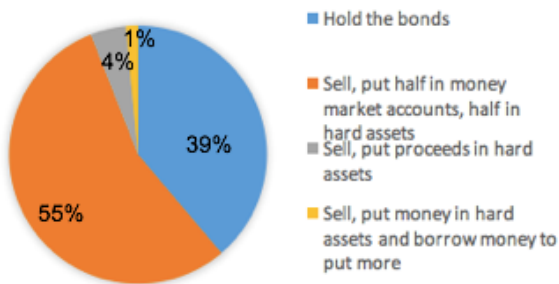
Q12: IN TERMS OF EXPERIENCE, HOW COMFORTABLE ARE YOU INVESTING IN STOCKS/STOCK MUTUAL FUNDS?



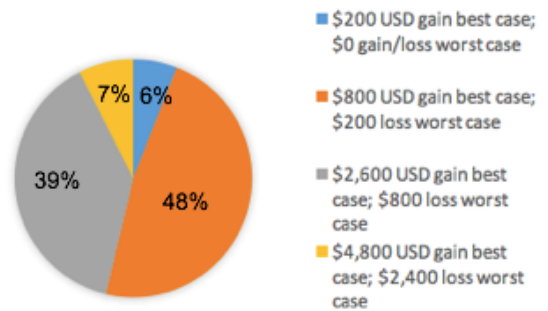
Q13: WHEN YOU THINK OF THE WORD 'RISK', WHICH OF THE FOLLOWING COMES TO YOUR MIND FIRST?



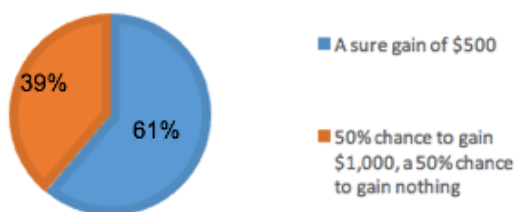
Q14: EXPERTS PREDICT PRICES OF HARD ASSETS WILL INCREASE IN VALUE. BOND PRICES MAY FALL, HOWEVER, GOVERNMENT BONDS SHOULD BE SAFE. MOST OF YOUR ASSETS ARE IN HIGH INTEREST GOVERNMENT BONDS. WHAT DO YOU DO?



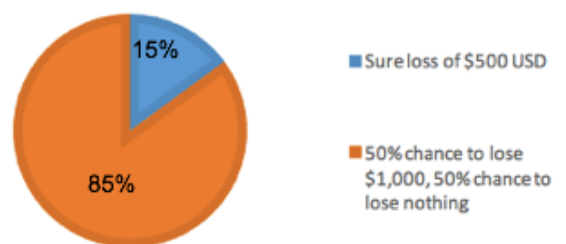
Q15: GIVEN THE BEST/WORST CASE RETURNS, WHICH OPTION YOU PREFER?



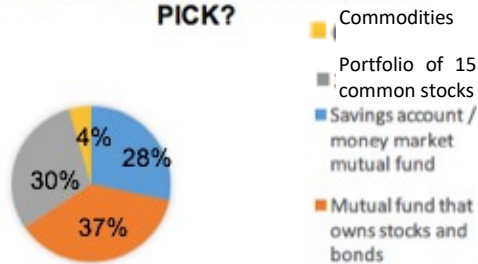
Q16: YOU HAVE RECEIVED 1,000 USD IN ADDITION TO WHAT YOU OWN. YOU ARE ASKED TO CHOOSE BETWEEN:



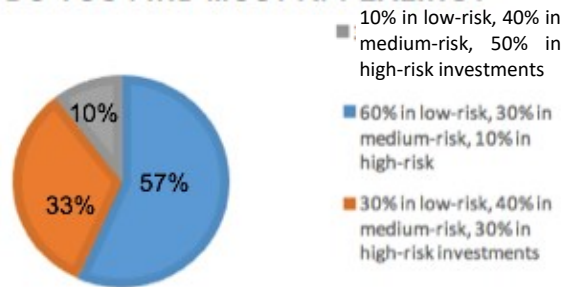
Q17: YOU HAVE RECEIVED 2,000 USD IN ADDITION TO WHAT YOU OWN. CHOOSE BETWEEN:



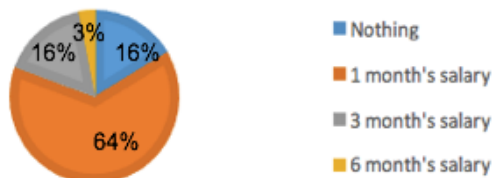
Q18: A RELATIVE LEFT YOU AN INHERITANCE OF 100,000 USD. YOU MUST PICK ONE OPTION TO INVEST ALL THE MONEY IN. WHICH ONE YOU PICK?



Q19: IF YOU HAD TO INVEST 20,000 USD, WHICH INVESTMENT CHOICE DO YOU FIND MOST APPEALING?



Q20: YOUR NEIGHBOR IS PUTTING TOGETHER A GROUP OF INVESTORS TO INVEST IN A GOLD MINING VENTURE. IT COULD PAY BACK 50-100 TIMES INVESTMENT OR BE WORTHLESS. CHANCE OF SUCCESS 20%. HOW MUCH YOU INVEST?



Notes

1. Other universities featured include the University of Helsinki (Finland), University of Turku (Finland), University of Tampere (Finland), Nanyang Technological University (Singapore) and Singapore University of Technology & Design (Singapore). Two of the students studied abroad from the country of their origin –their universities were located in the UK (Imperial College London) and the Netherlands (Leiden University).
2. Other majors/faculties featured in the study included Mathematics, Arts, Physics, Chinese Studies, Industrial Design and Pharmacy.

